

**ARCHITECTURE DEPARTMENT**

**CHINESE UNIVERSITY OF HONG KONG**

MASTER OF ARCHITECTURE PROGRAMME

2004-2005

DESIGN REPORT



## **INVISIBLE DYNAMICS**

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May 2005



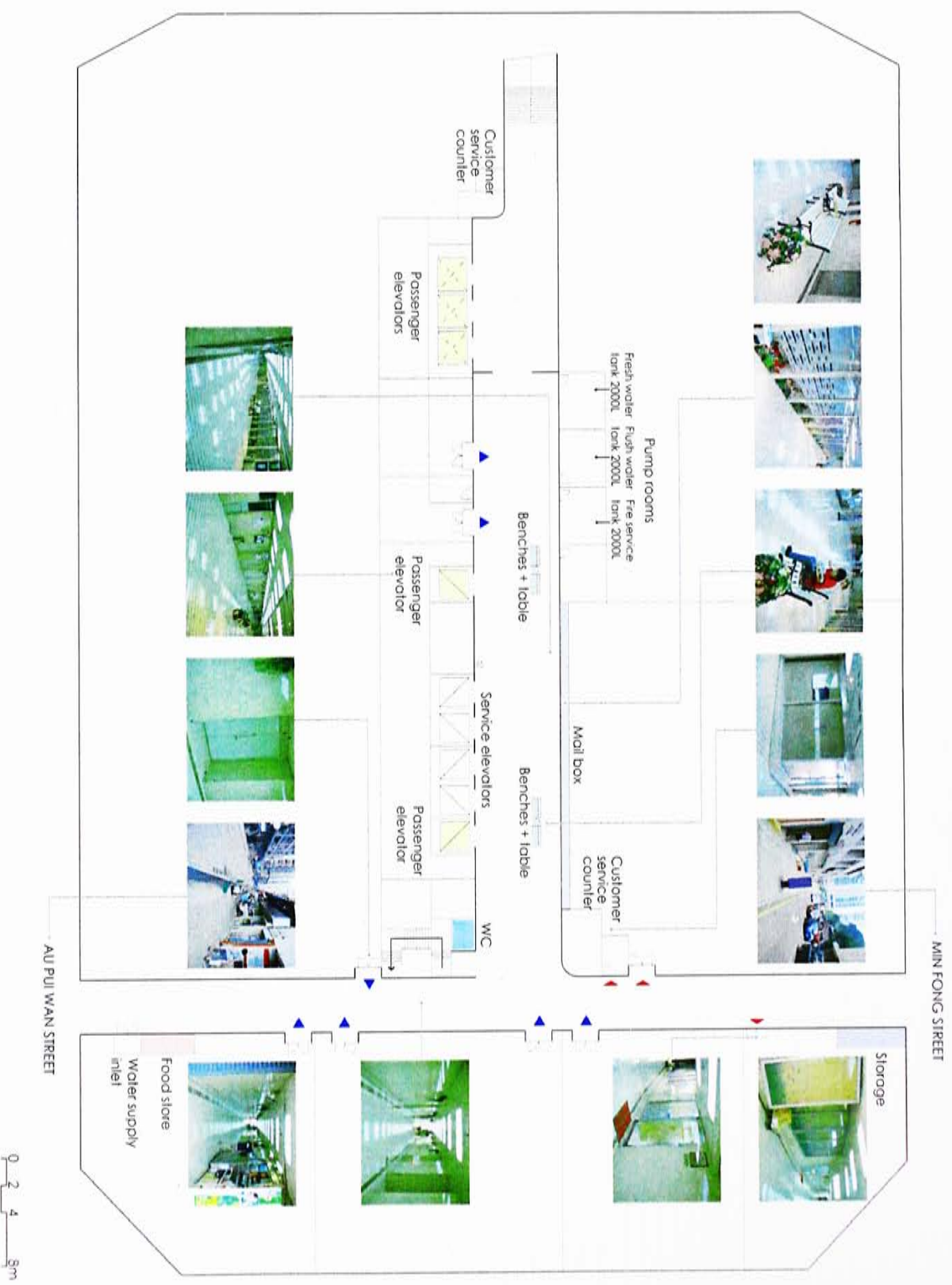
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# 1\_Introduction

## 1.1\_Preface - Experience in Fo Tan

One day I was walking in Fo Tan and I had to go to one street from another. I reached a building, in which I found a passage through the building allowing people to use as a short cut. The passage supposed to be the main entrance of the building is linked to the lift lobby. Due to the wideness of the passage and lift lobby, the passage is quite open and welcoming. Although it is a private property and an indoor space, it can be conceived as a public and open space because of wideness of the space and presence of furniture. The space inspired me on this thesis to study the connectors in the city.





## **1.2\_Thesis issue**

### **1.2.1\_Underground space**

Pedestrian subway, one of the most common connectors in Hong Kong, was chosen as the object of study in this thesis.

With the rapid increase in population and economic development in Hong Kong since the 1960's, there was an increase in vehicles as well as road accidents. Hong Kong's roads have one of the highest vehicle densities in the world. In March 2004, there were over 520,000 licensed vehicles and only 1,935 km of roads. Therefore, in order to avoid conflict between vehicles and pedestrians, concern for safe road crossing was evoked. Pedestrian subway completely segregating pedestrians from vehicular traffic was considered as a safer road crossing facility. The benefits of the grade separated crossing for vehicular and pedestrian traffic are twofold: maximizing pedestrian safety when crossing the road and no disruption to vehicular traffic.

However, subway is not always welcomed by pedestrians due to its poor quality. In the coming years, Hong Kong will become a modern metropolis with even higher densities in vehicles and population. Thus, space created in the pedestrian subway allowing people to enjoy freedom and leisure to walk along in the city without interfering with the vehicular traffic will become more important and it will be investigated in this thesis.

### **1.2.2\_Programmed urban life**

We are living in a programmed life in the city. The land uses in the city are "well" planned. Every part of our daily life is guided by the planning regulations. The places for living, working, eating, entertainment, etc, are located in the destined locations. People are rushing in the city for their own purpose without paying attention to the environment and the others because they are all "expected".

The open space, place for leisure and gathering, is also planned in the city. However, the location of the open space is usually not favorable due to the high land value and its low priority in the city. Therefore, it can only serve the one who come to enjoy the place intentionally.

Thus, creating the place for people to stay, to meet the others and to relieve from the busy daily life in the existing urban area would be another concern in this thesis.

## 2\_Underground space

### 2.1\_Potential benefits

#### Climatic

- The soil and rock as a large thermal mass provide a wide range of energy conservation and protect the underground structure from severe weather.

#### Protection

- The earth can effectively protect the structure from noise, vibration, external explosion and fire, radioactive fallout.

#### Security

- Access points are limited and easily secured.

#### Containment

- A reverse function of protection. Hazardous materials storage and processes below ground can take advantage of protection and isolation.

#### Aesthetics

- The underground structure may have less visual impact on the surface environment and the unique interior character can give people a memorable experience.

#### Environmental

- The natural landscape environment can be preserved.

#### Materials

- The building materials can have longer life span due to the moderate and constant temperature and sealed environment.

### Potential drawbacks

#### Climatic

- It is difficult to reject excess heat production.

- Protection from surface floods and water leakage must be provided.

#### Communication

- Communication within underground networks and between the surface and underground space may be impeded.

#### Human issues

- Psychological acceptability and physiological concerns have to be considered.

- Fire safety, personal and health safety are the other important concerns.

#### Environmental

- Underground structure may disturb and degrade the geologic environment in which they are placed.

## Potential benefits

### Layout

- 3-dimensional planning is allowed due to the absence of topographic and existing land use constraints.

### Cost

- The land cost is usually low for an underground structure if there is no impact on the existing surface use.
- Weather independent construction can save cost in severe climate area.
- Scale of excavated materials is possible.

- Cost benefits can be made from savings in specialized design features such as thermal facilities, security system, exterior finishes, etc.

- The physical isolation of underground structure from environmental effects that deteriorate building components can result in low maintenance cost.

### Land use efficiency

- Land surface is preserved for uses requiring the surface environment.

### Transport and circulation efficiency

- The ability to improve urban densities contributes to compact development that can allow more efficient transport and circulation patterns.

### Less construction disruption

- Disruption to the existing area is less than equivalent surface construction.

## Potential drawbacks

### Layout

- Ground support may be needed in order to maintain stability in the surrounding geologic environment.

- Access points are limited by surface topography and existing surface uses.

### Cost

- Confined work conditions, ground support, ground excavation, transportation, disposal of the ground may increase the initial cost.

- There is cost uncertainties in ventilation and lighting equipment, personal access, maintenance and repair.

### Embodied energy

- The embodied energy is higher than surface structure due to energy for excavation, transport, disposal of soil and rock to form opening and the energy required to process, manufacture, transport and install all the material used in construction.

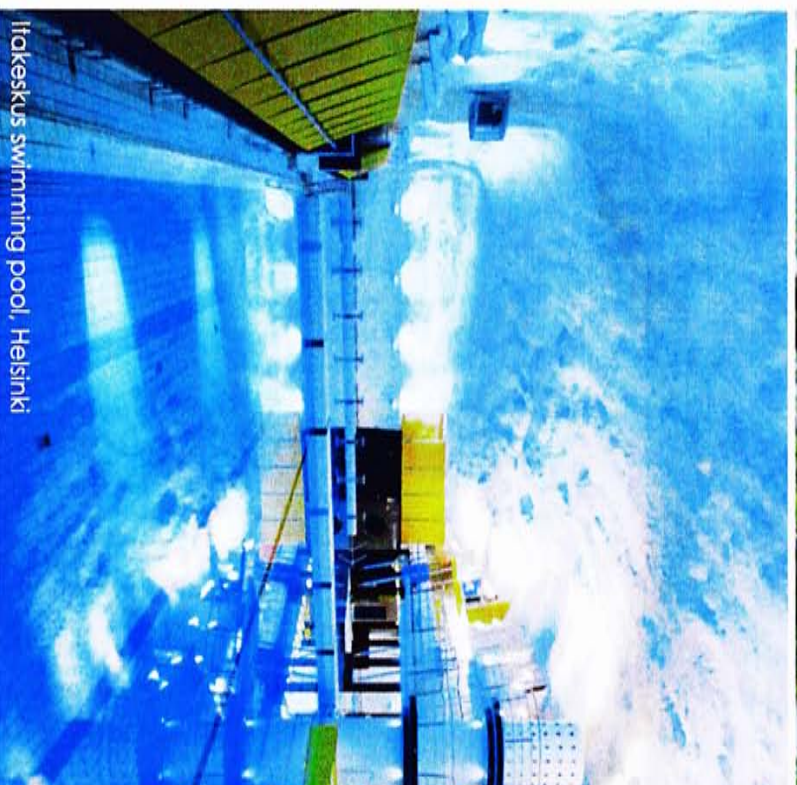


## 2.2\_Uses of underground space

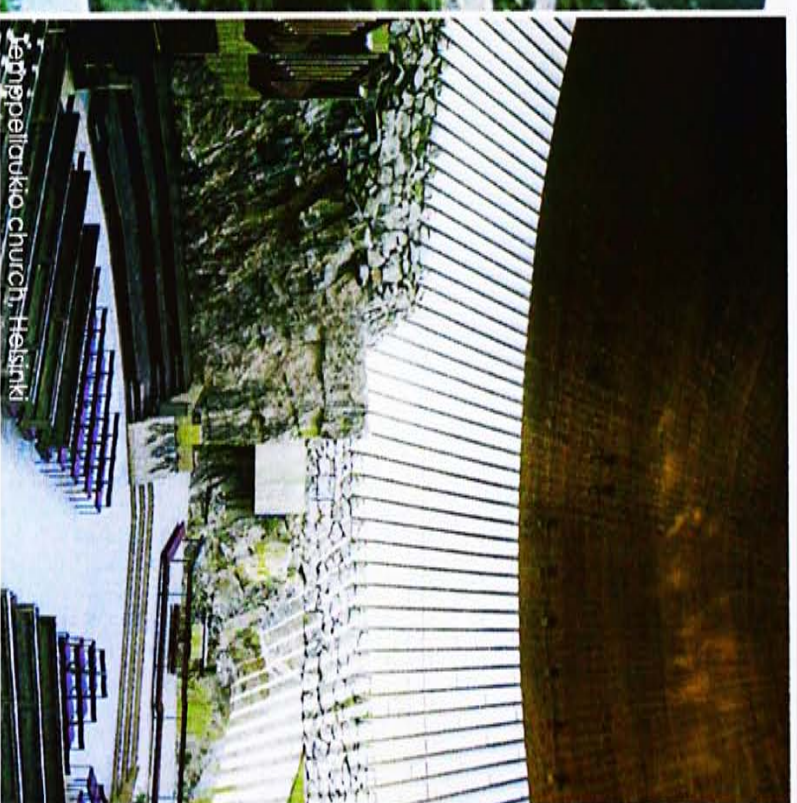
- Residential
- Religious
- Recreation/ sports facilities
- Parks
- Commercial
- Institutional
- Industrial
- Military and civil defense facilities
- Storage
- Transportation
- Utility services



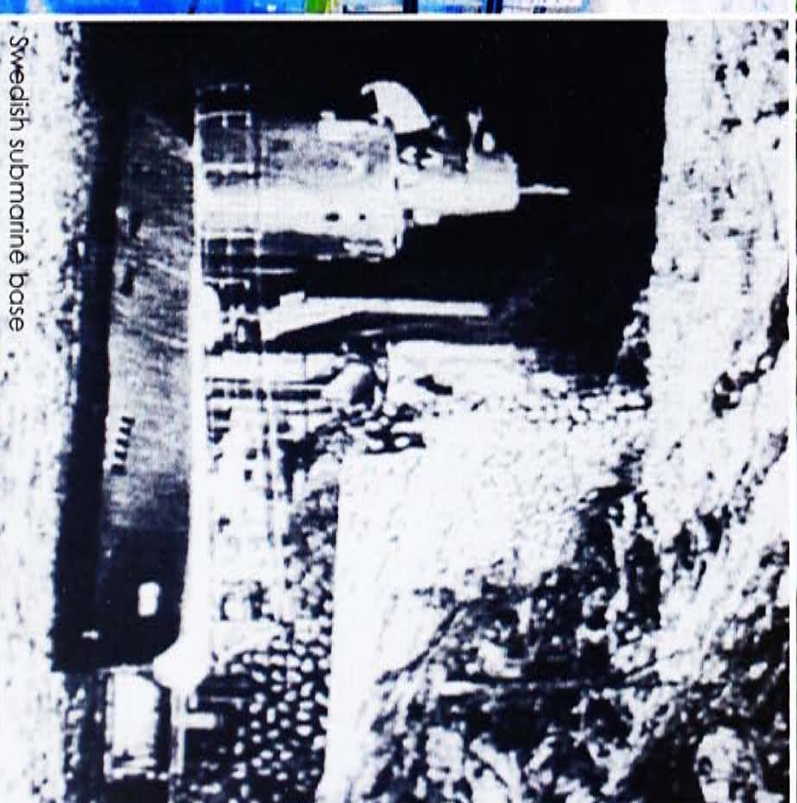
Rock dwelling, Guadalupe, Mexico



Itäkeskus swimming pool, Helsinki



Jenipellaukio church, Helsinki



Swedish submarine base

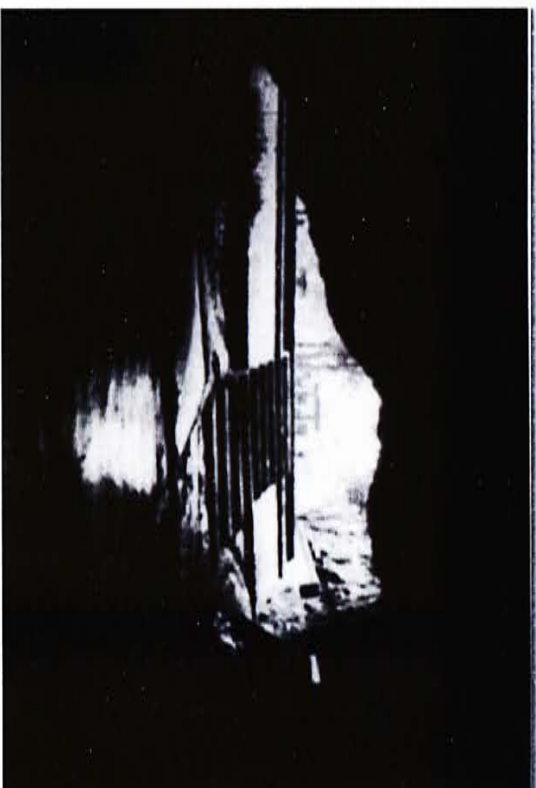


## 2.3\_Potential psychological problems

1. lack of distinct image
2. difficulty of finding entrance
3. fears and negative associations from downward movement
4. lack of windows reduces reference point to exterior, lack of spatial orientation
5. loss of stimulation from natural environment on surface
6. a sense of confinement
7. association with darkness, coldness, dampness
8. connotation of less desirable or lower status space
9. fear of collapse, entrapment in fire, flood, earthquake

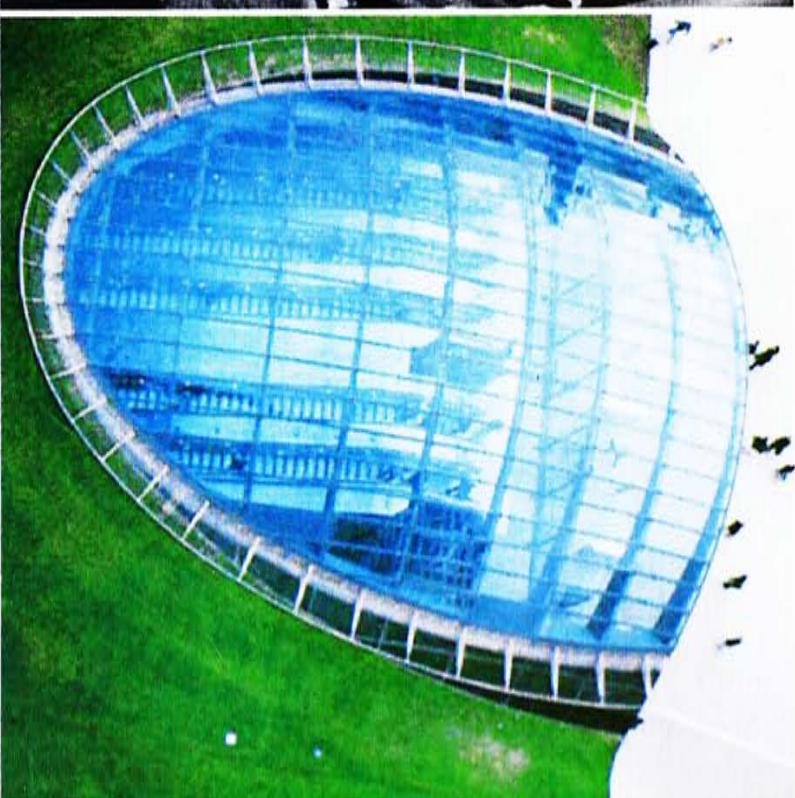
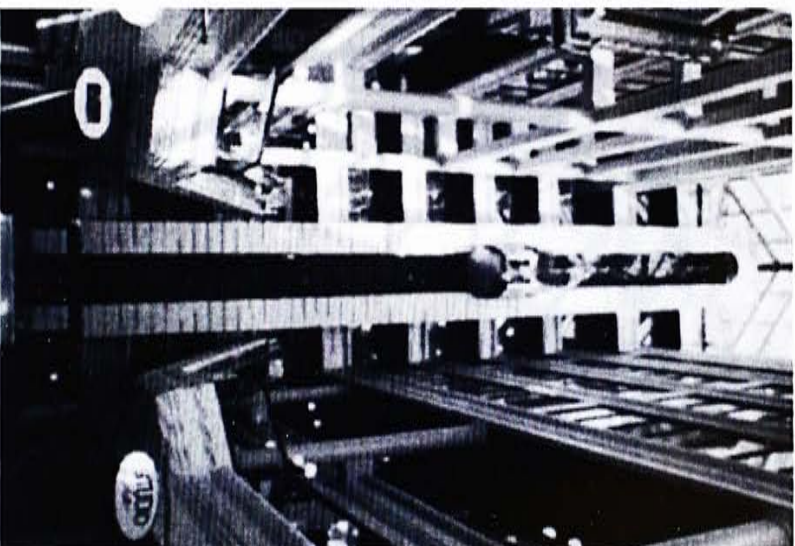
## 2.4\_Potential physiological problems

1. artificial lighting lacks the characteristics of sunlight
2. poor ventilation and air quality
3. potential negative health effects due to high level of humidity



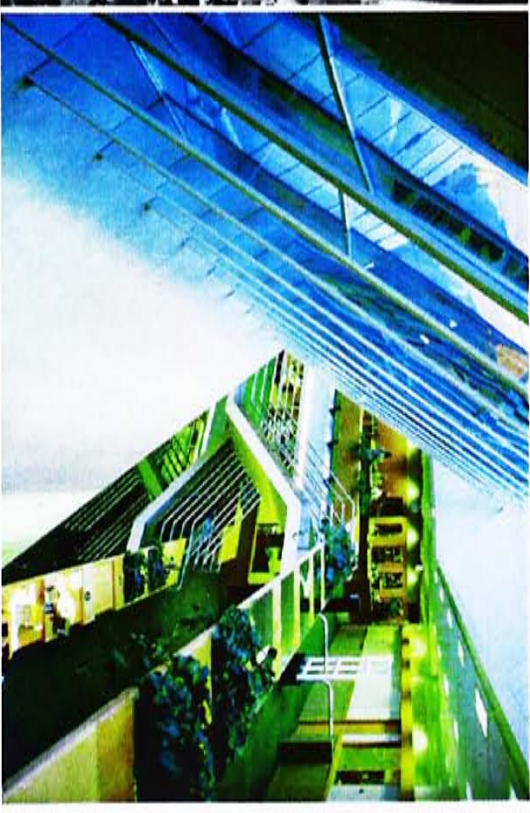
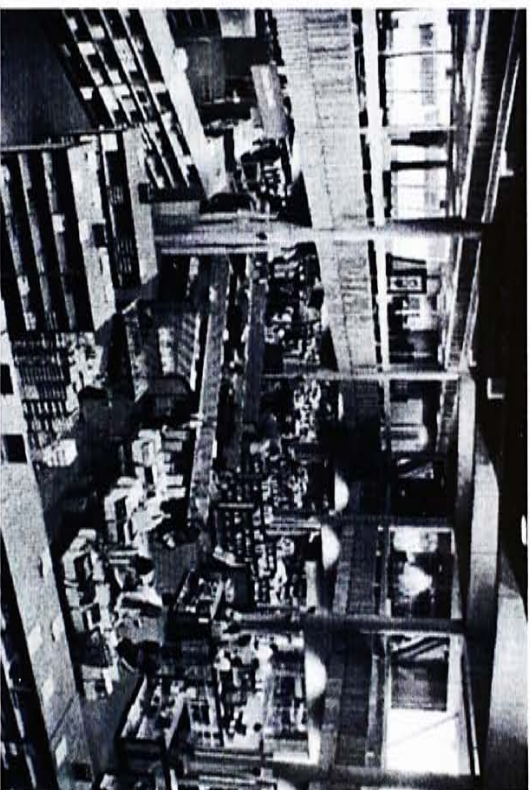
## 2.5 Design objectives

1. Exterior and entrance
  - a. articulate building boundary and exposed architectural elements (such as having a clear entrance) to clarify building's location
  - b. prevent building service from dominating the building image
  - c. create variety and complexity in entry
  - d. provide graceful transition to lower levels
  - e. make entrance and vertical circulation spacious and well-lighted
  - f. establish visual connection to exterior through entrance



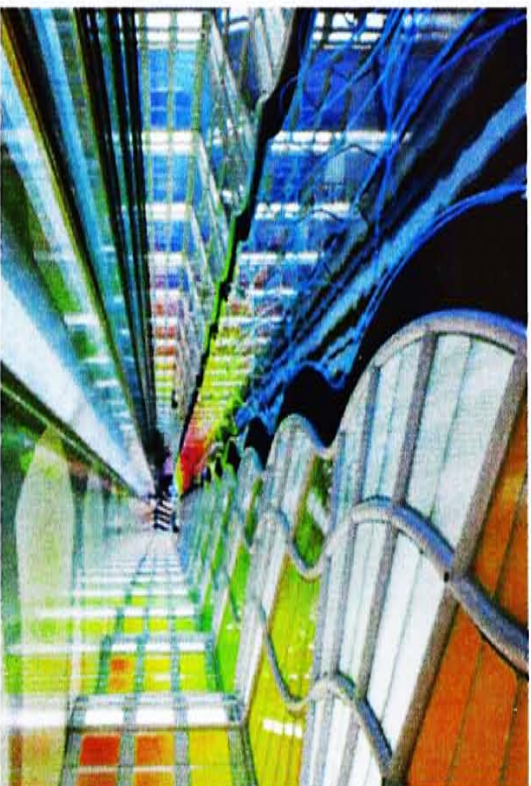


2. Layout and spatial configuration
- a. create interior layout which is easy understand
  - b. create varied and stimulating indoor environment
  - c. provide visual connection to exterior if possible
  - d. enhance spaciousness by providing extended interior view, manipulate room size and shape

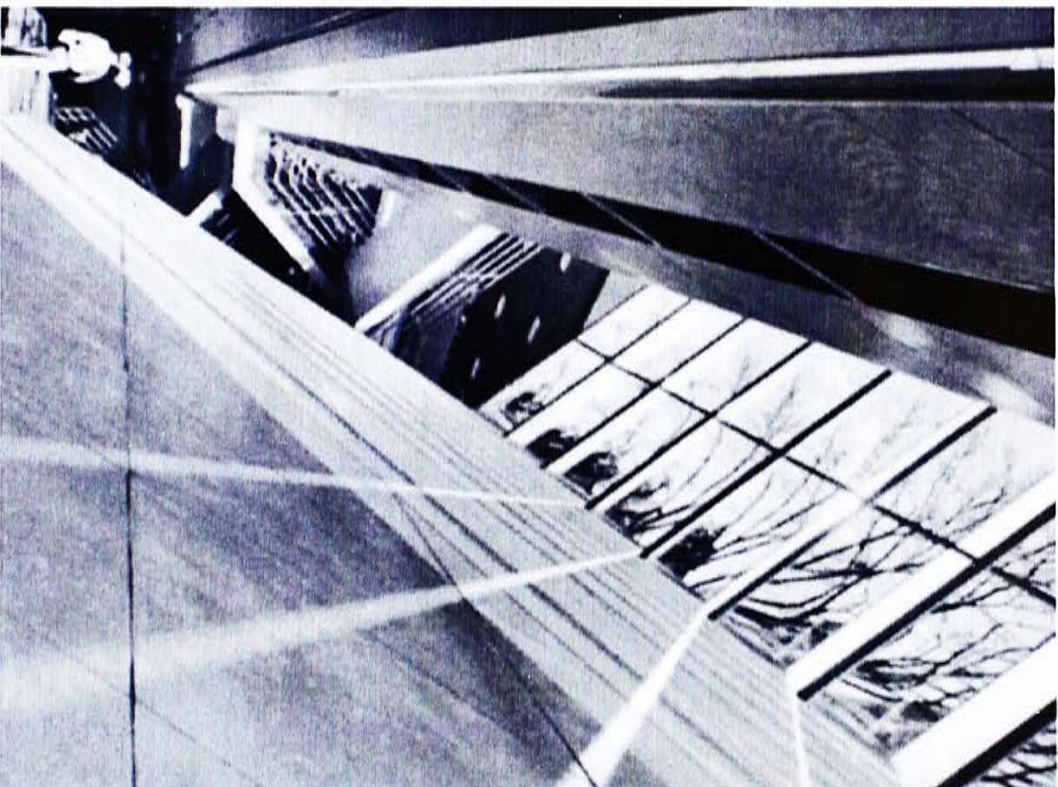




3. Interior elements and systems
- a. create environmental stimuli such as installing art works
  - b. connection with natural world
  - c. create feeling of warmth by colour, material and texture
  - d. provide fresh air and thermal comfort
  - e. provide clear signage system



4. Lighting
- a. provide appropriate levels of illumination to enhance visual clarity
  - b. provide natural light whenever possible
  - c. simulate natural light characteristic
  - d. use lighting to create stimulating environment



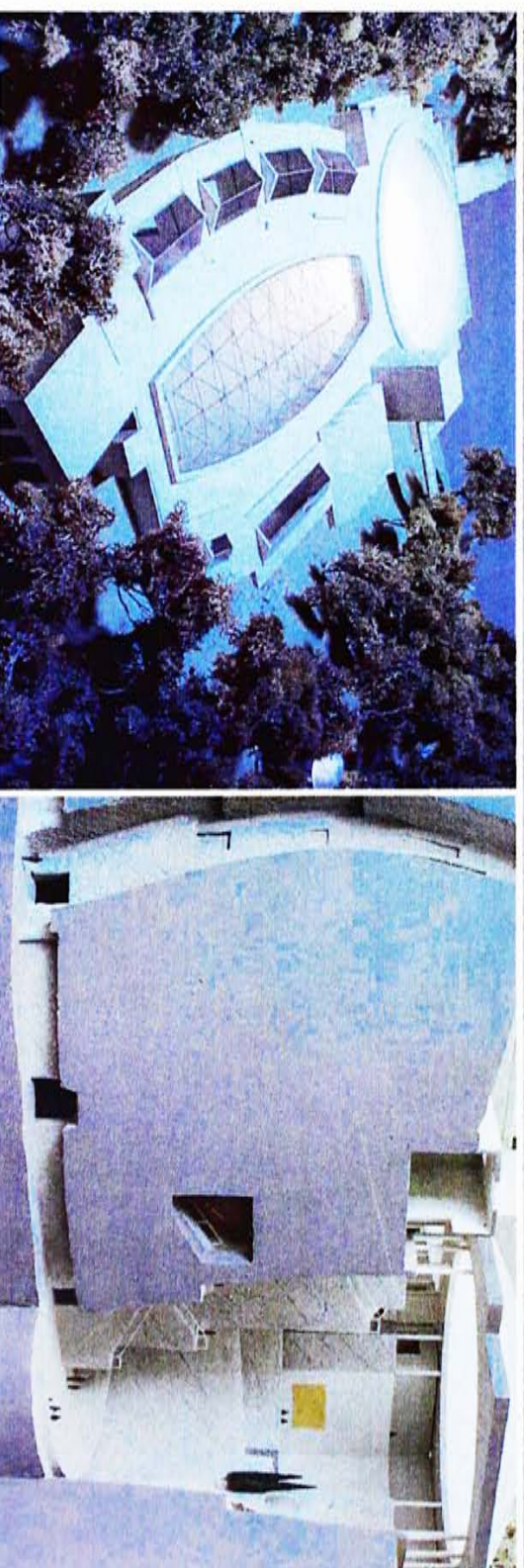
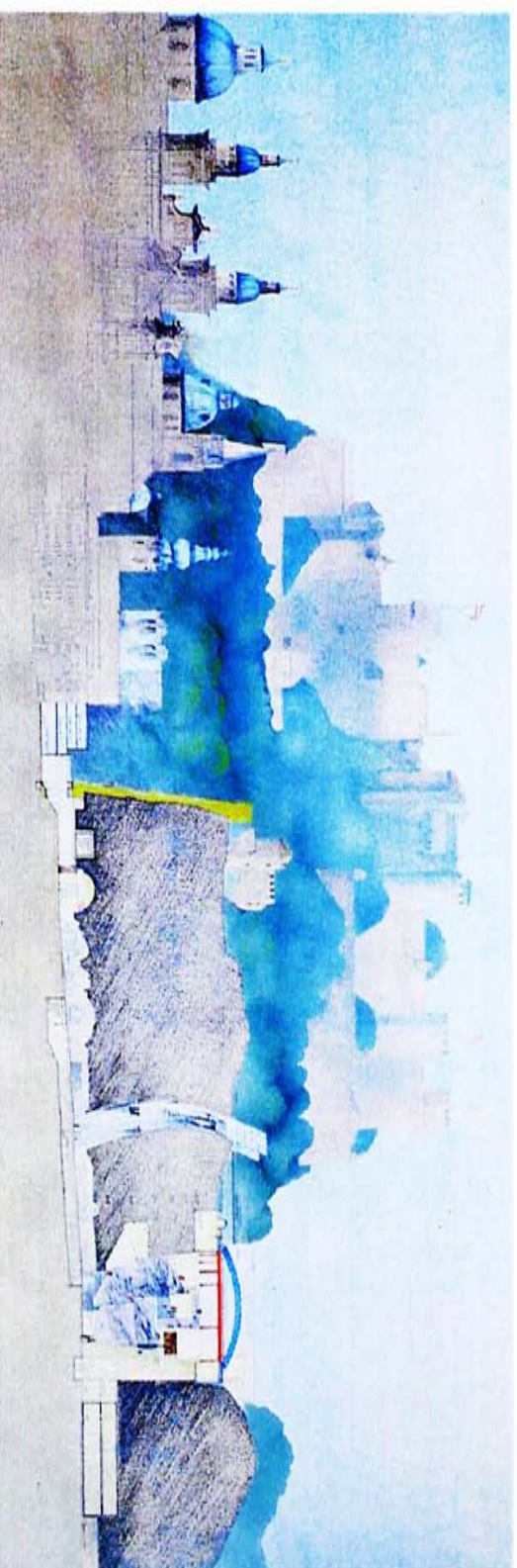


### 3\_Precedent study

The Guggenheim Museum Salzburg,  
Austria

Hans Hollein 1990

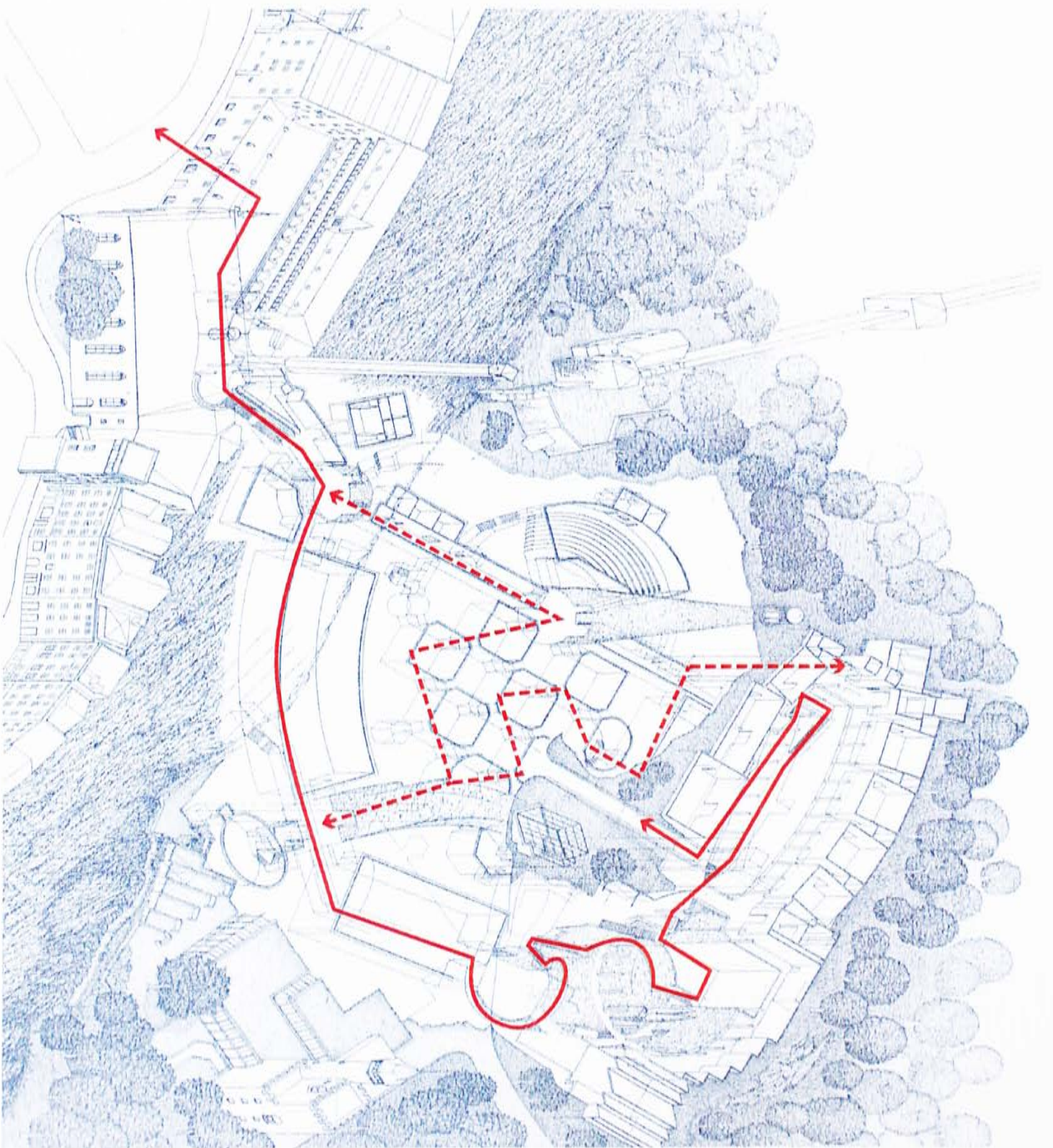
The museum was created deep in the rock of the mountain, Monchsberg, not to spoil the appearance of the historic city by adding modern architecture. The way in is from below, from the direction of the historic city then leads upwards towards the light through the mountain. From its highest level the upper exit leads out onto a plateau which affords a view across the city.





### 3.1\_Two paths

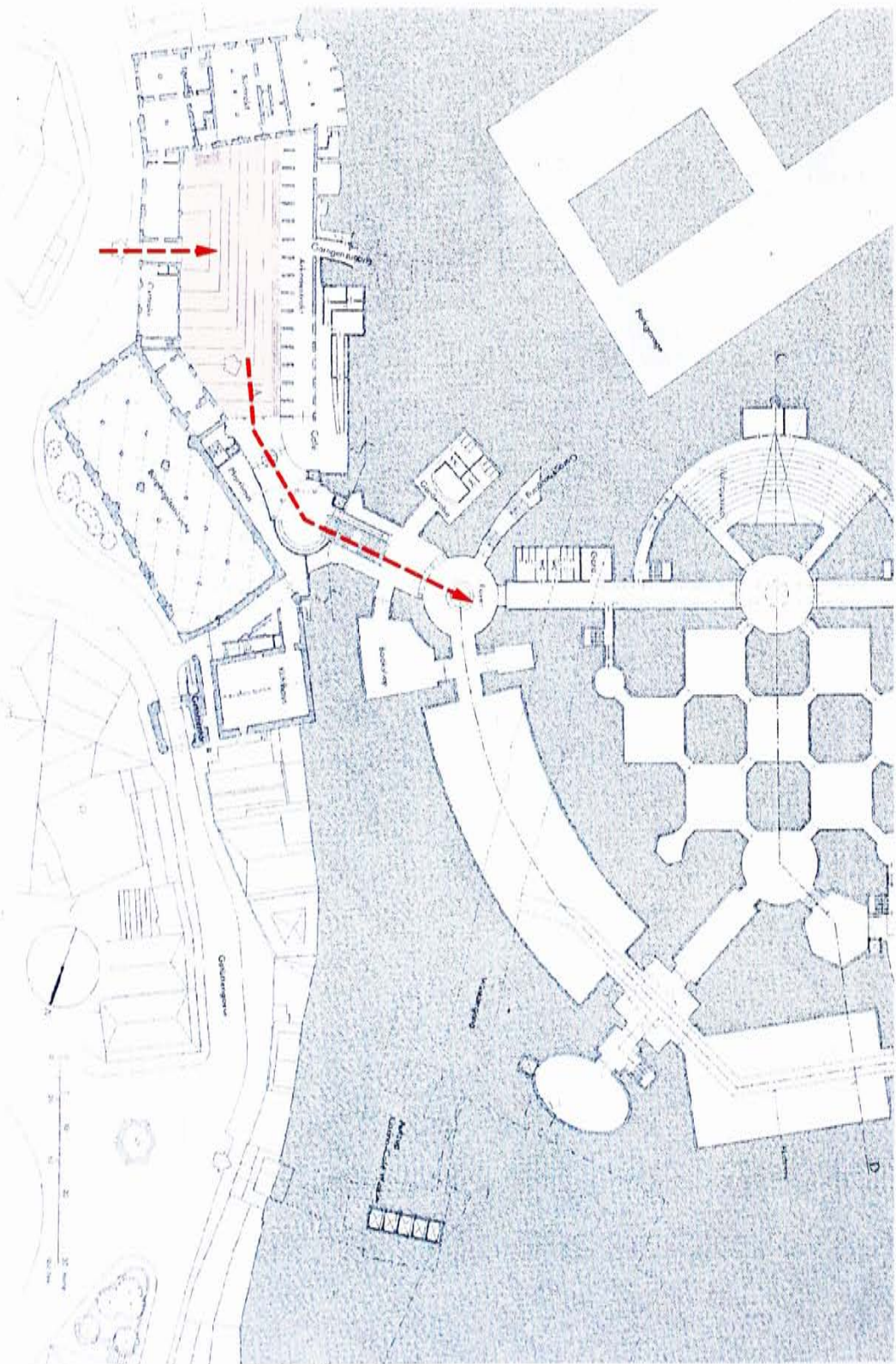
The visitor can either choose to take the quick linear way through or immerse himself more deeply in the Museum by taking the long way round, which allows him to pass through the small individual galleries in any directions he likes.





The visitor enter the museum from the bustling city through the tranquil courtyard of the Bursghospital, a hospital complex.

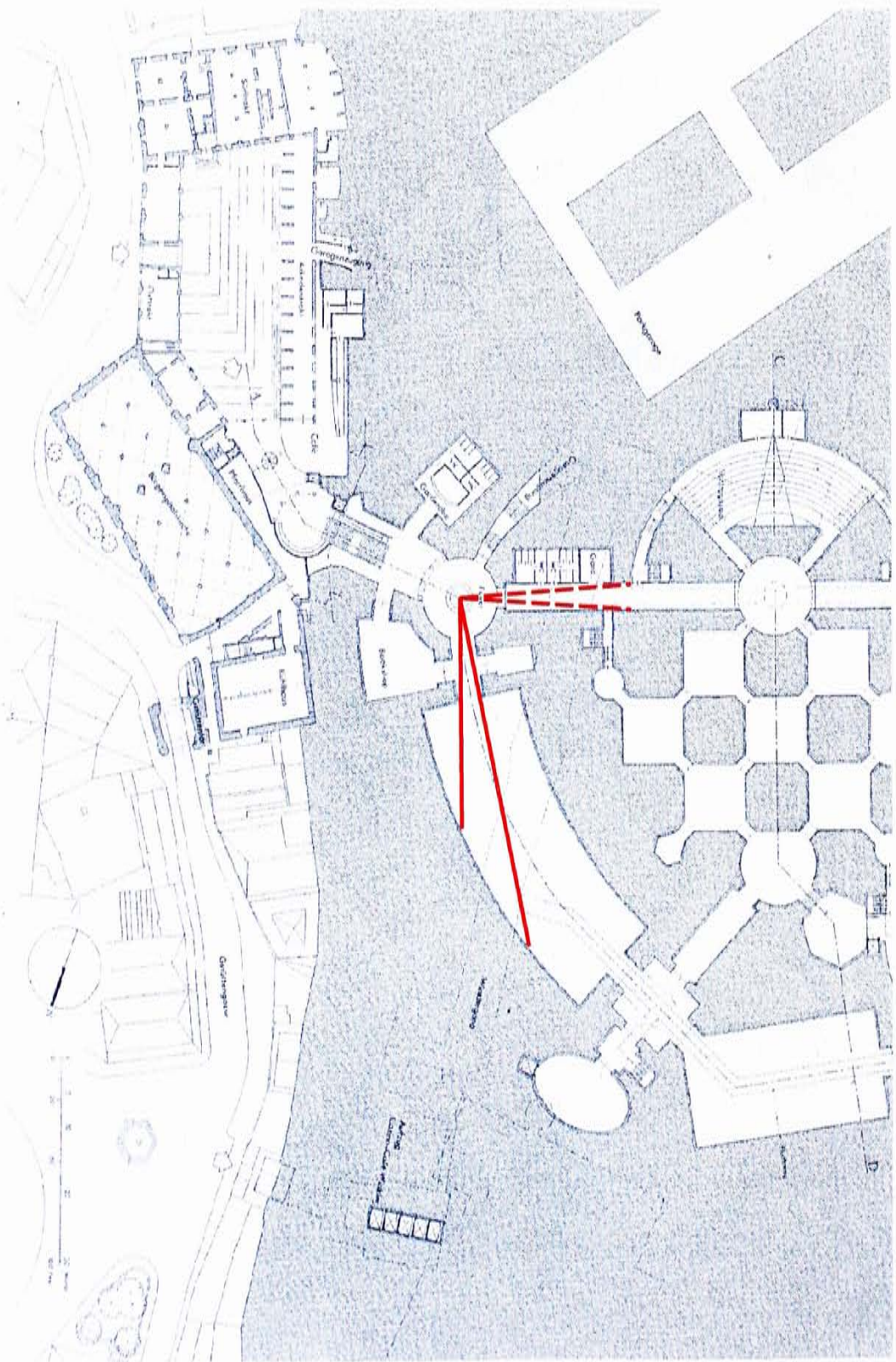
The visitor enter the museum from the bustling city through the tranquil courtyard of the Bursghospital, a hospital complex.





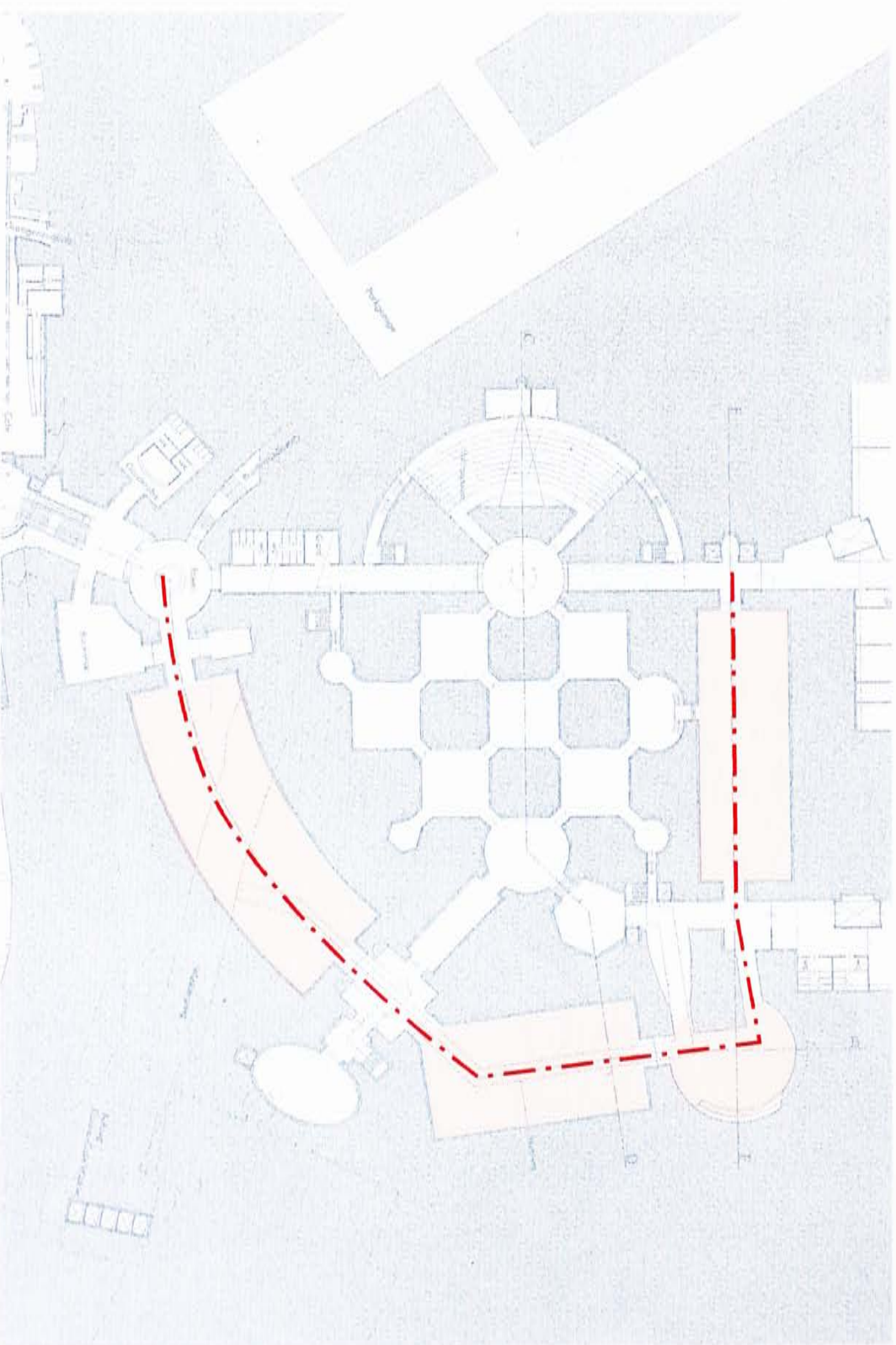
### 3.3\_Place of decision

Viewing at the foyer, visitor can choose the curved direct route leading to the double volume exhibition space or the straight and narrow corridor leading to the small galleries.



### 3.4\_Proportion and direction

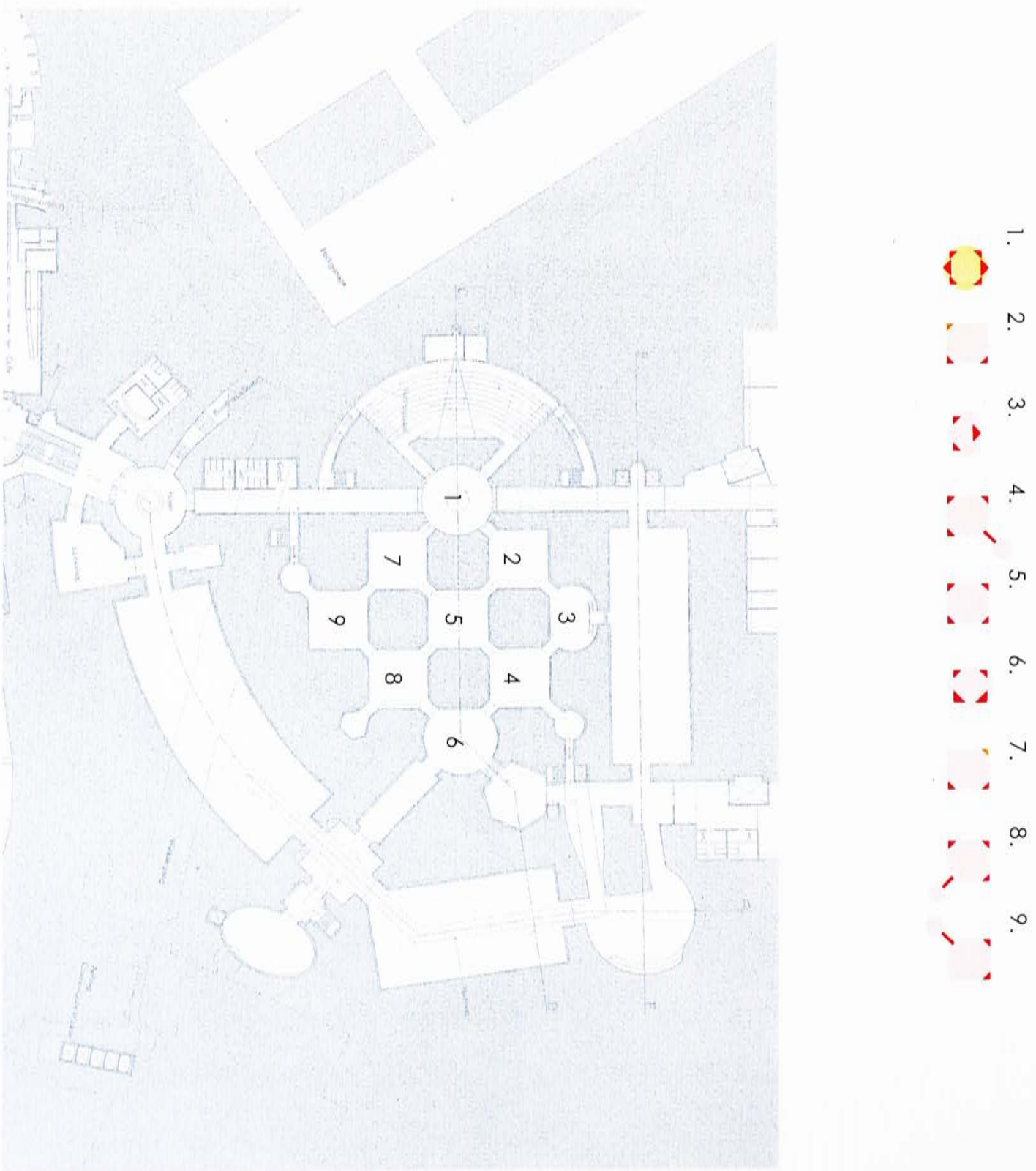
The longitudinal permanent exhibition galleries sitting on the main axis create a strong direction leading to the extraordinary atrium which is lit by daylight through its glass dome connecting to the special exhibitions at upper level.





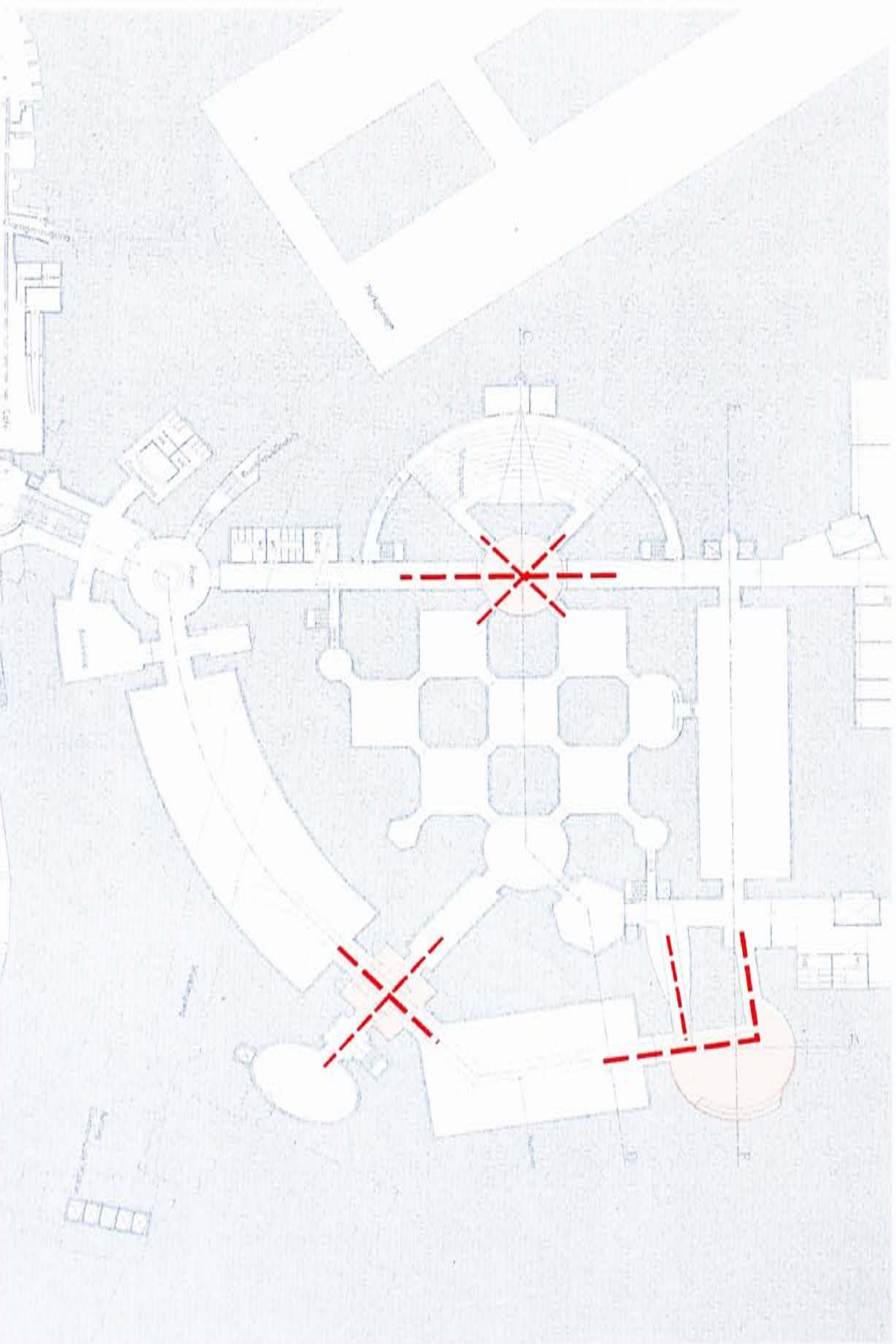
### 3.5 Identities

All the small galleries are different from the others in terms of form, or number of accesses, or lighting, thus giving people a sense of orientation.



### 3.6\_Natural lighting

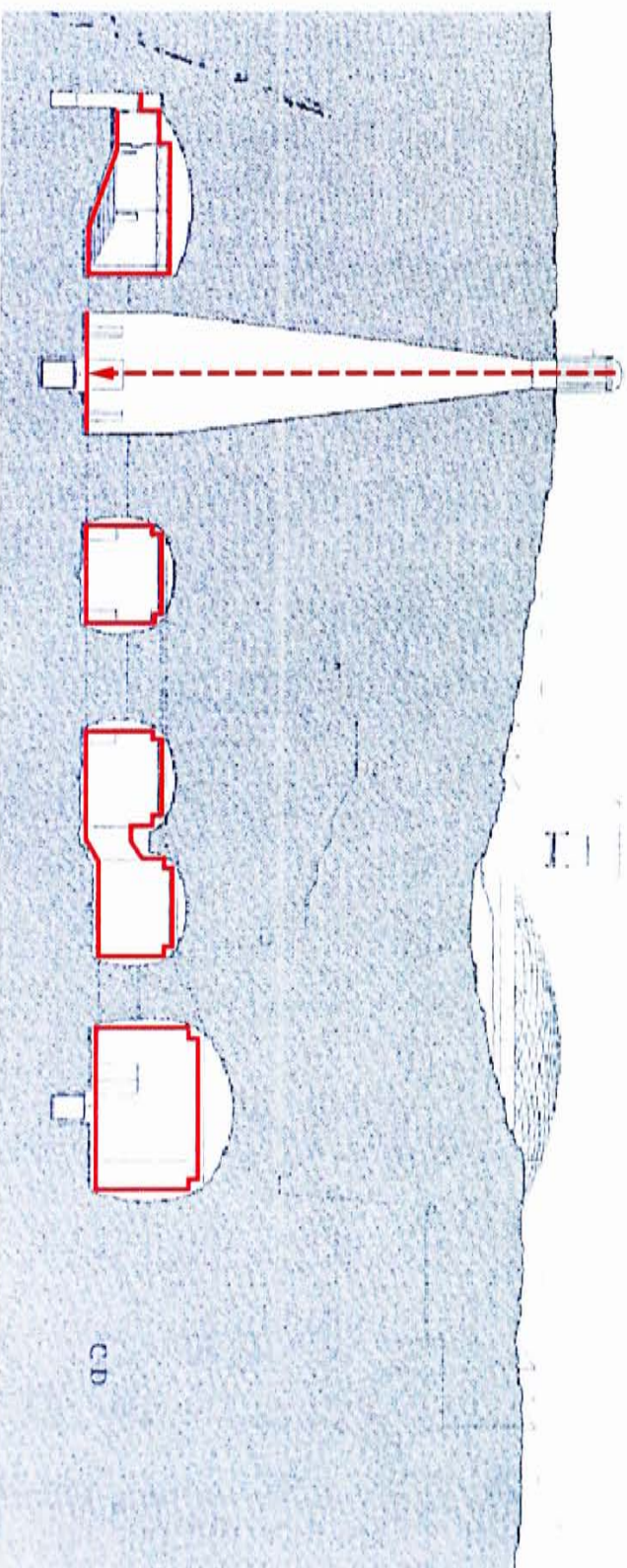
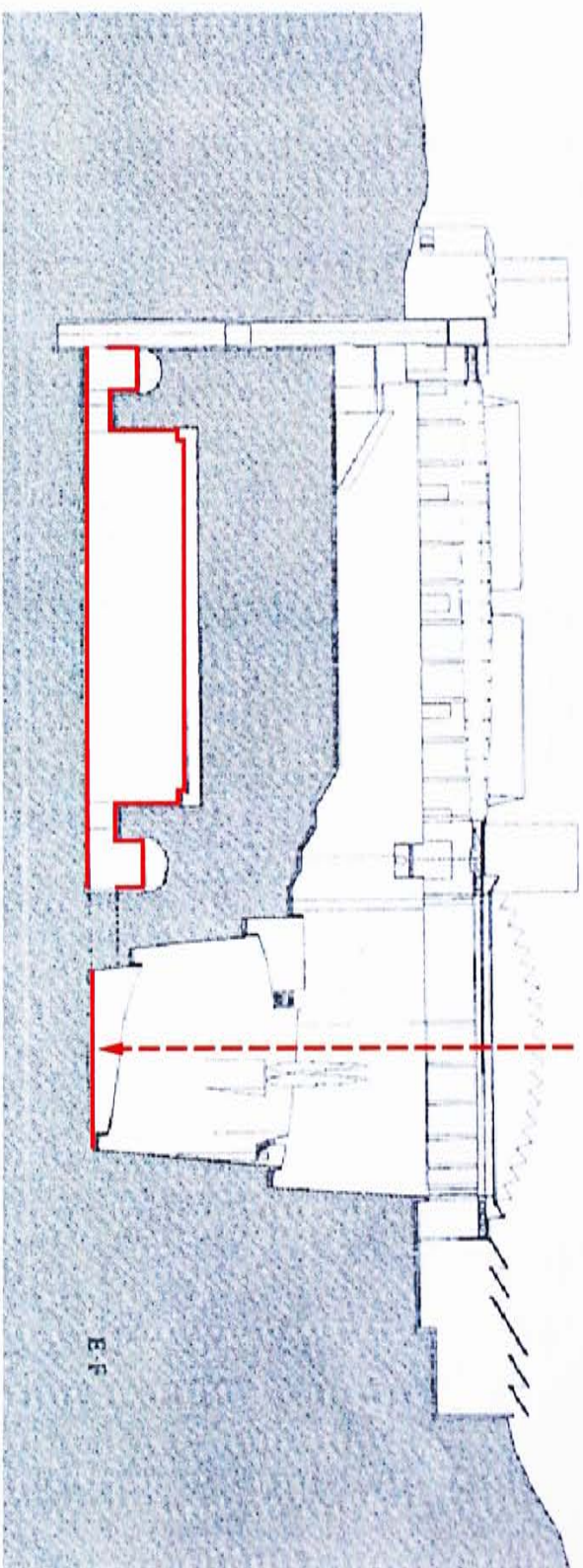
Natural sunlight is introduced into the important crossing points in the museum thus establishing reference to exterior and give people orientation.





### 3.7\_Experience the nature

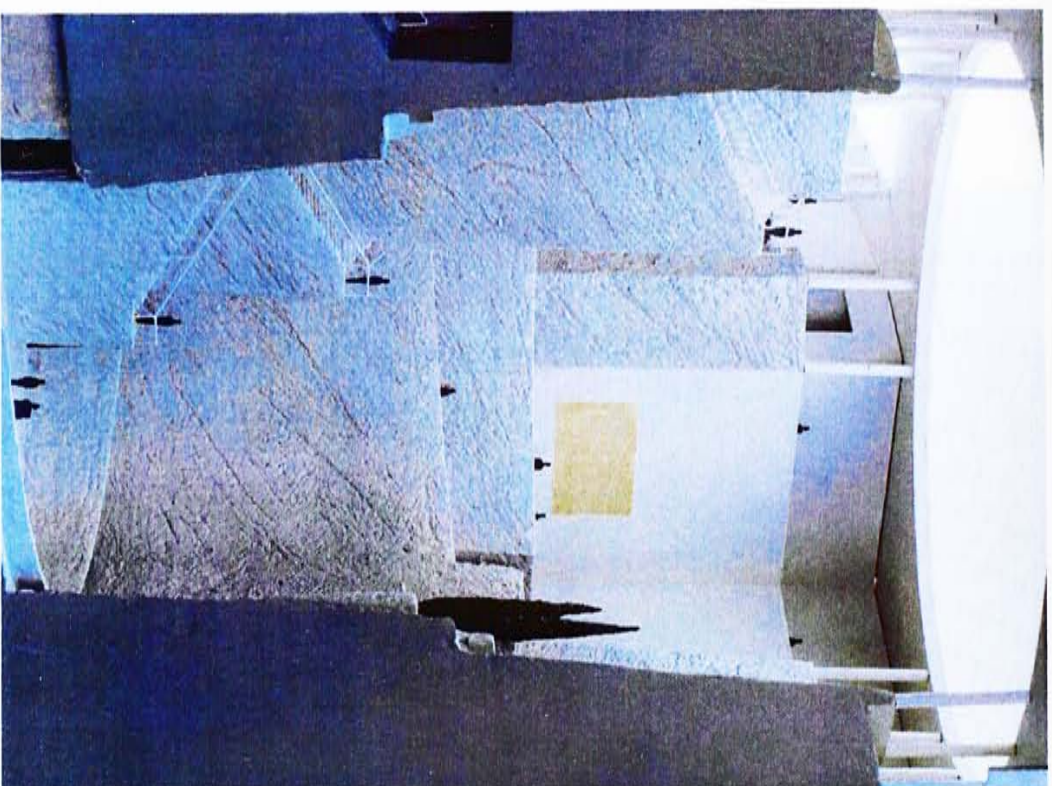
Walls of the important spaces are to retain the rough hewn rock surface while the other rooms are given a second, inner shell in order to create clear and simple conditions for presentation. Thus, mountain's interior can be experienced as nature and, in part, as an artificial, inwards-looking environment. This further emphasizes the identities of the anchor spaces which eventually act as the landmark in the underground.





'In contrast to additive -tectonic above-ground building, subtractive building in rock allows a spatial concept and expansion which is much freer and more complex in its plasticity - true three-dimensionality. The differences of ground plan and section have been resolved. Space develops in every direction.'

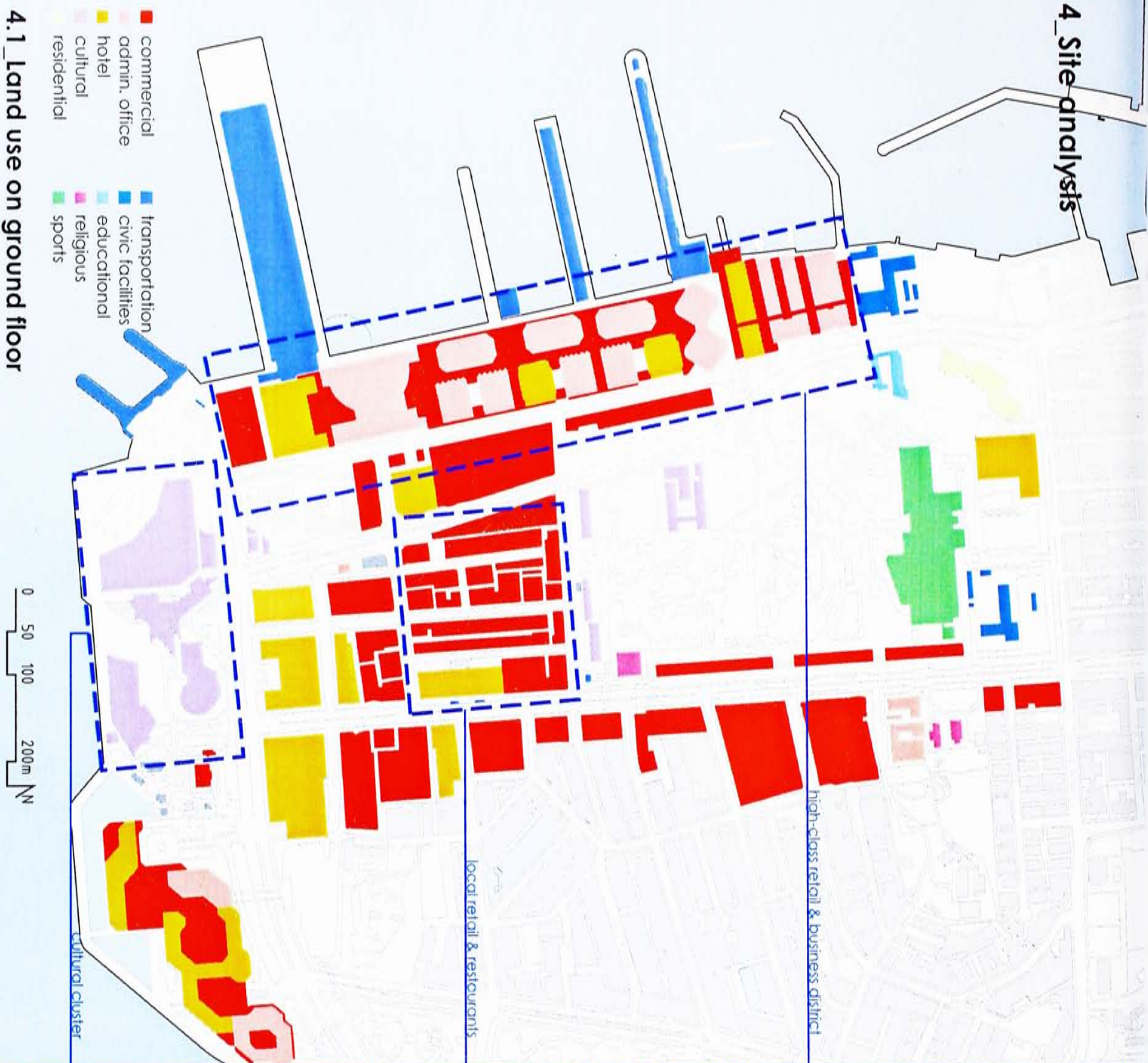
Hans Hollein



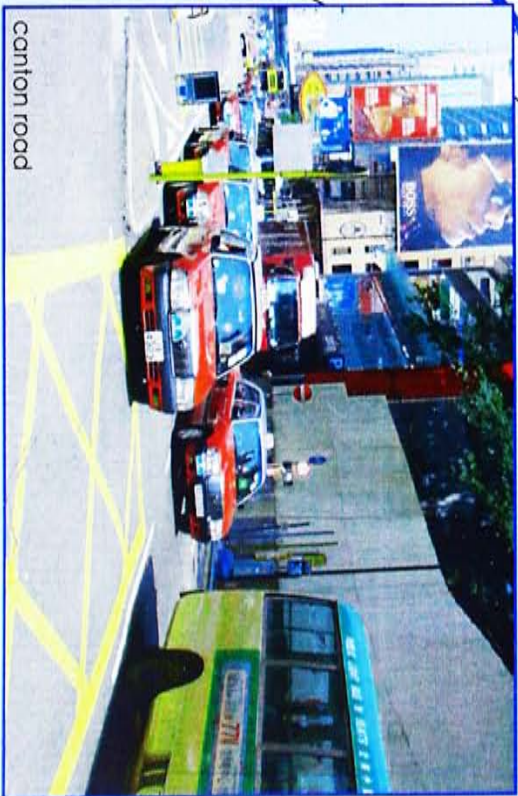


# 4\_Site analysis

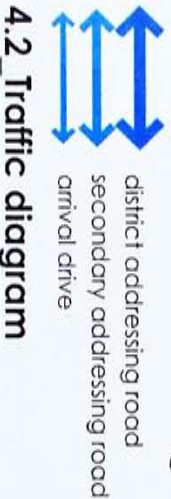
## 4.1\_Land use on ground floor







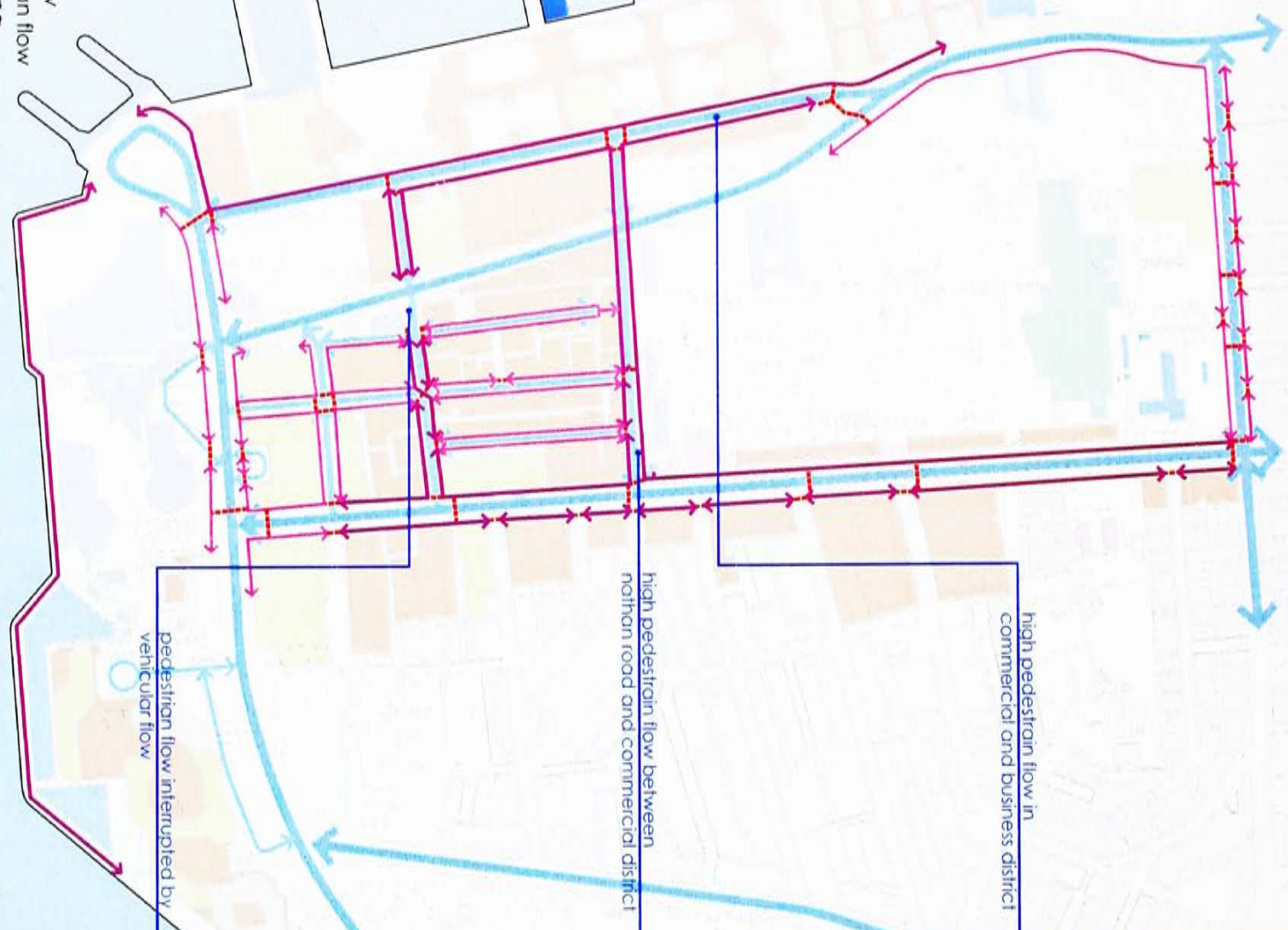
canton road



4.2 Traffic diagram





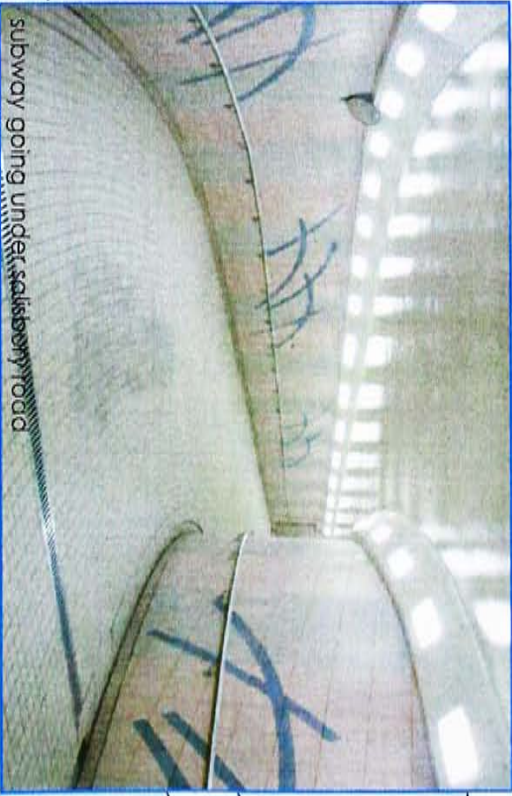
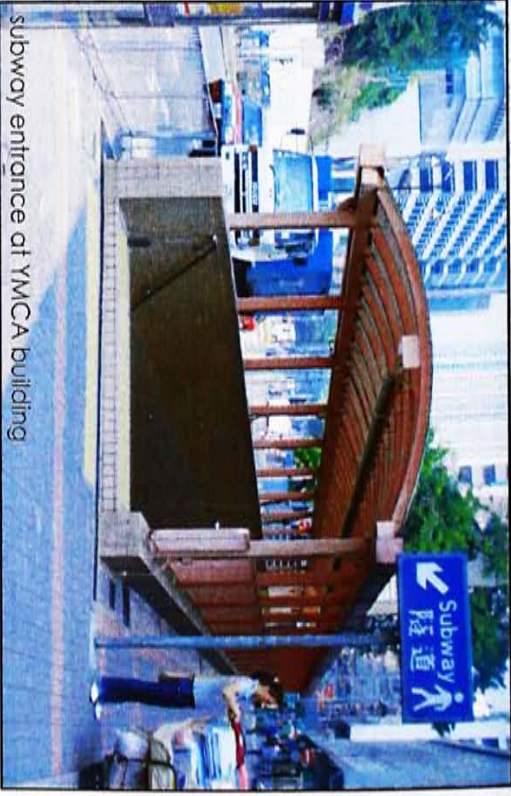


- main pedestrian flow
- secondary pedestrian flow
- at-grade road crossing

### 4.3 Pedestrian flow diagram



# 4.4\_Pedestrian subways







Entrance  
 road subway entrance surrounded by the back  
 facades of the buildings, hidden behind a small park and  
 facing the turning corner of a vehicular road



Spatial quality  
 sense of confinement due to the uniform material, lighting in  
 salisbury road subway

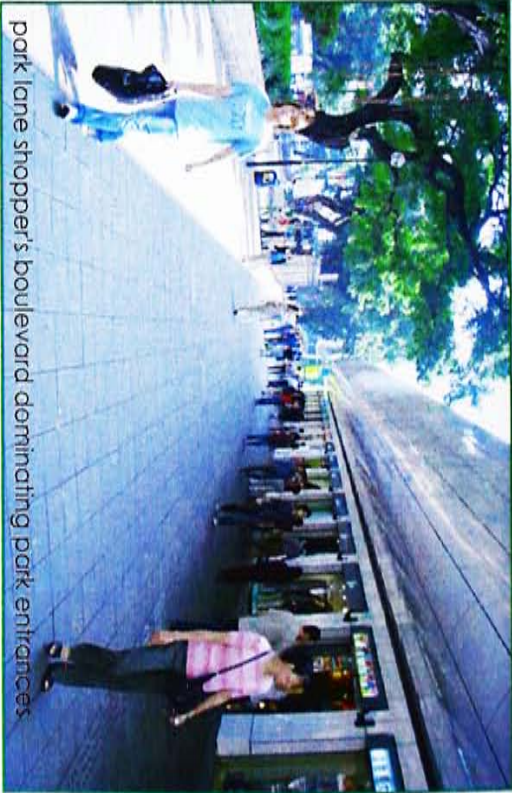


Orientation  
 people lose the orientation after going down a turning stair and  
 being in a monotonous space of peking road subway



Transition  
 the material of the entrance is sharply differentiated from the  
 material of the subway





park lane shopper's boulevard dominating park entrances



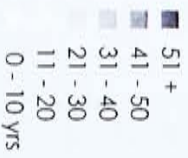
open space at high level



seating prohibited in garden!







4.7\_Building Age



June 30th

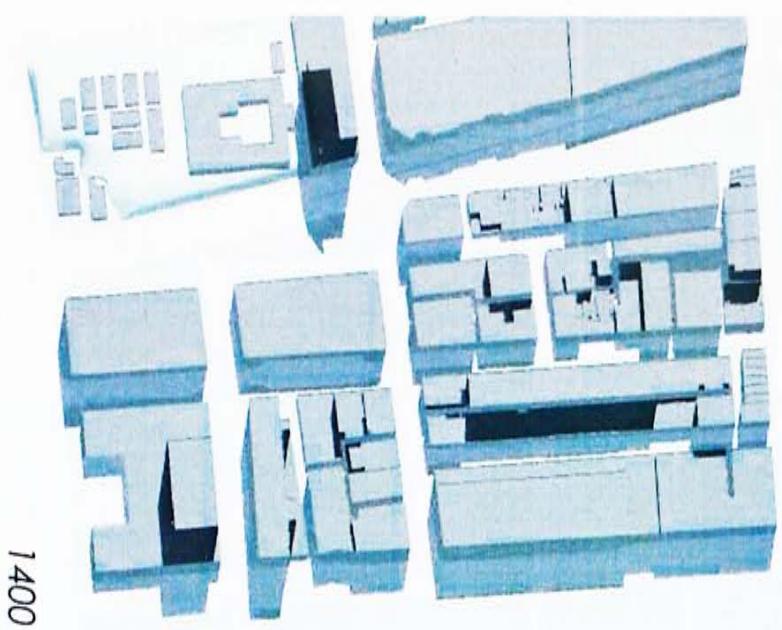
September 30th

December 31st

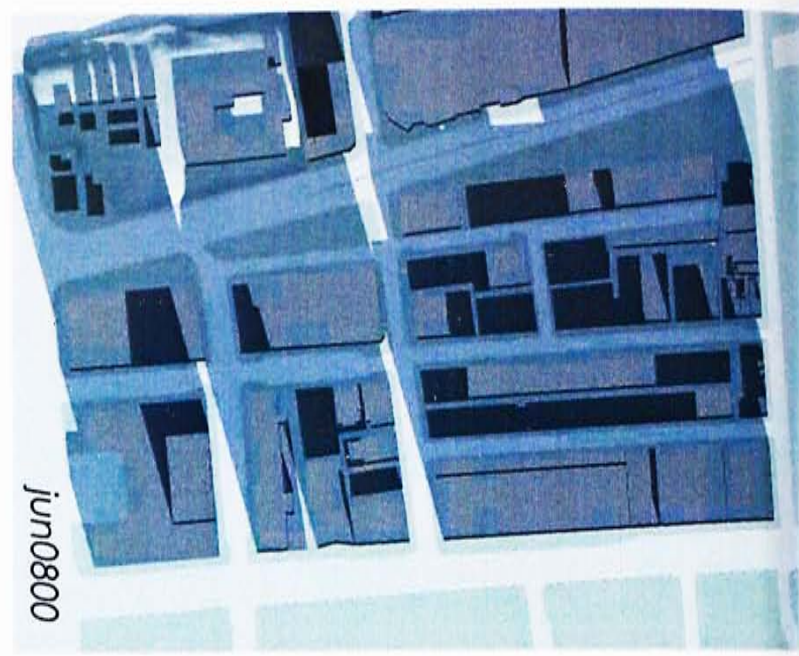
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0800, 1000, 1200, 1400, 1600, 1800

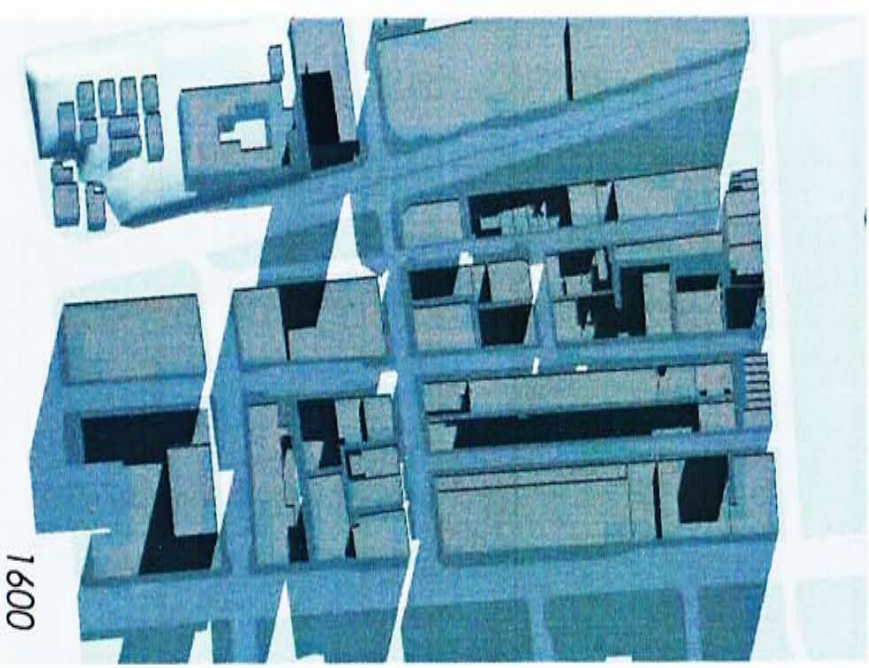




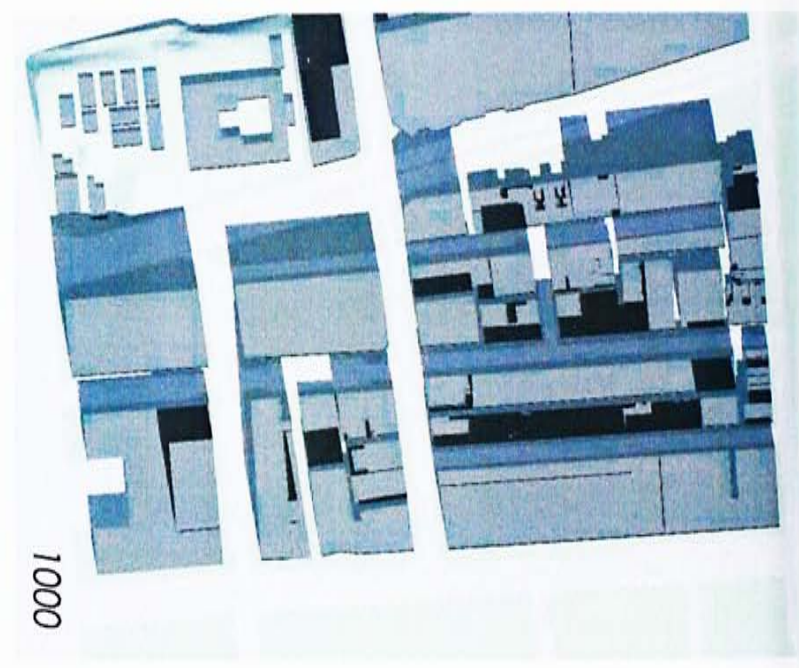
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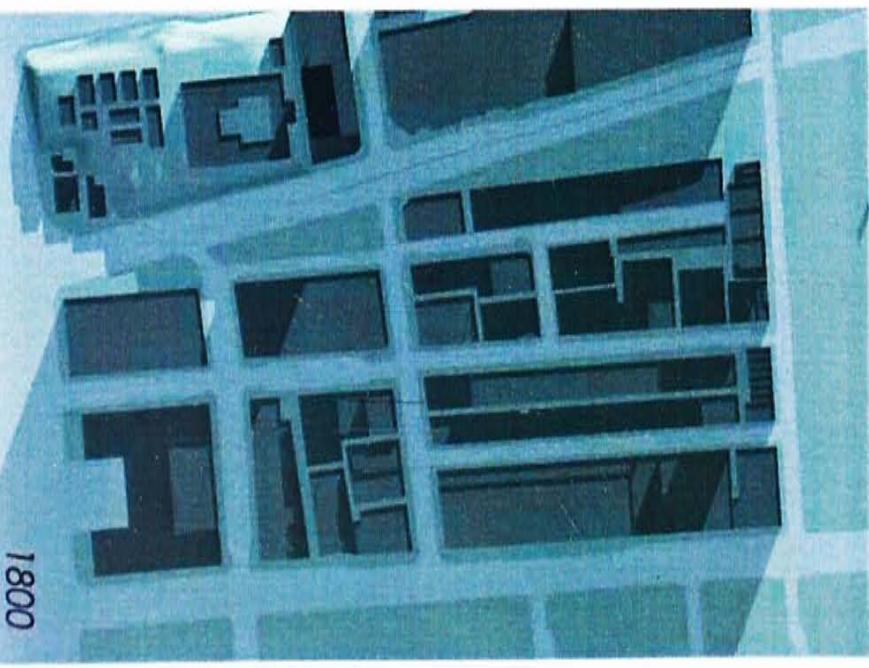
jun0800



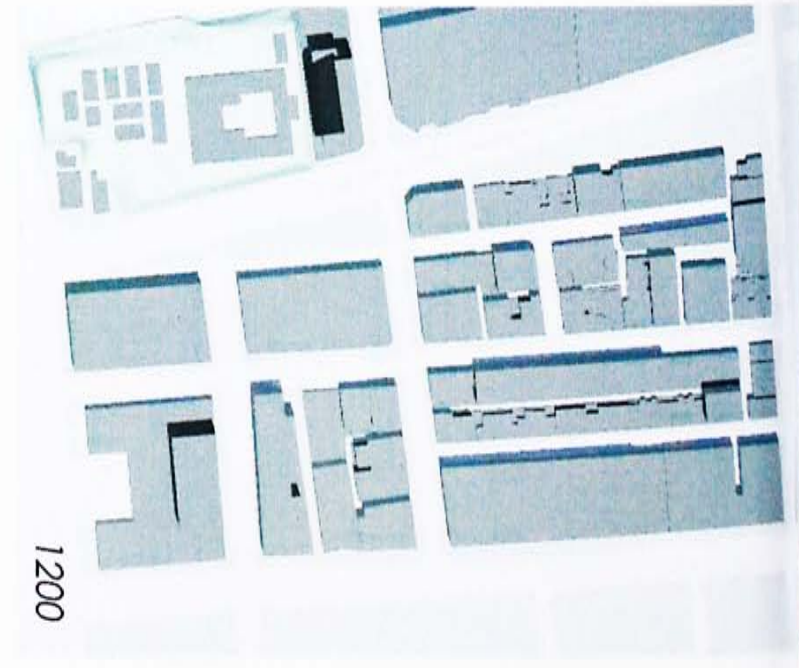
1600



1000

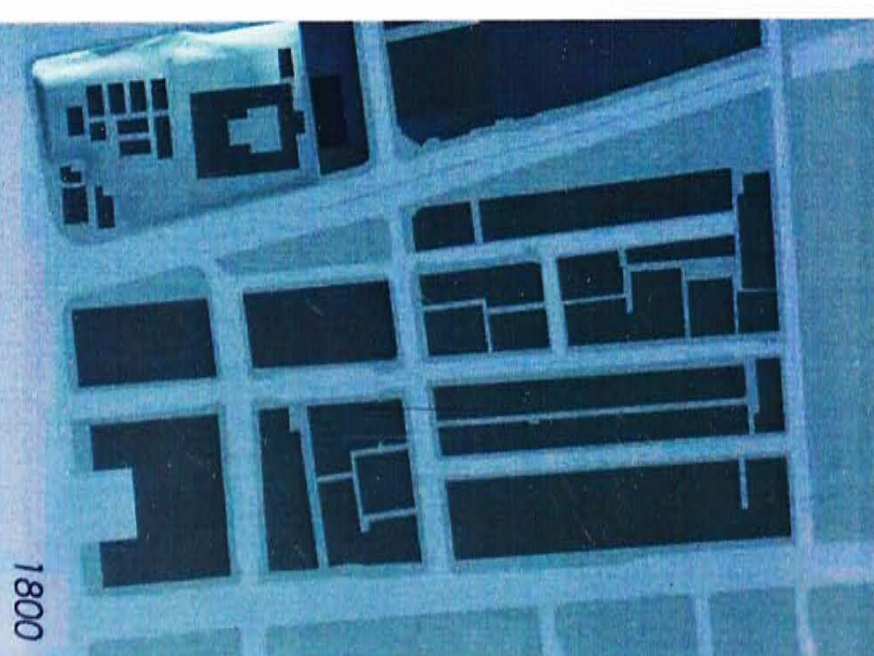
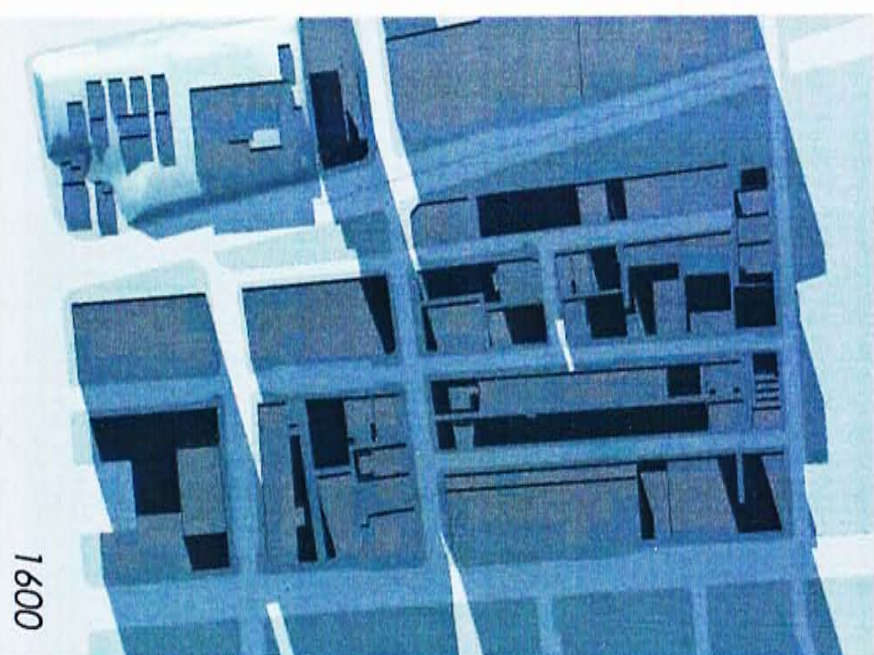
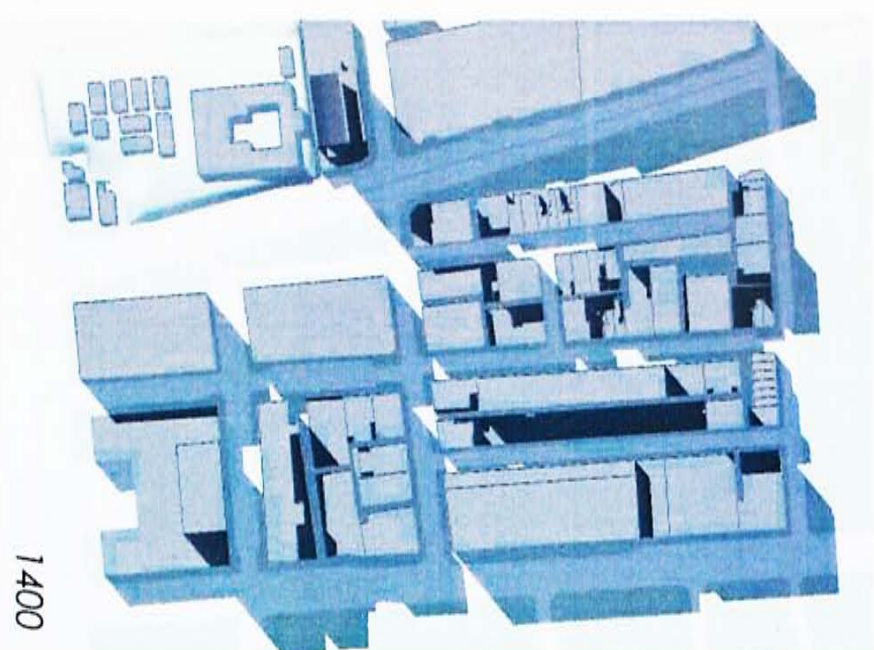
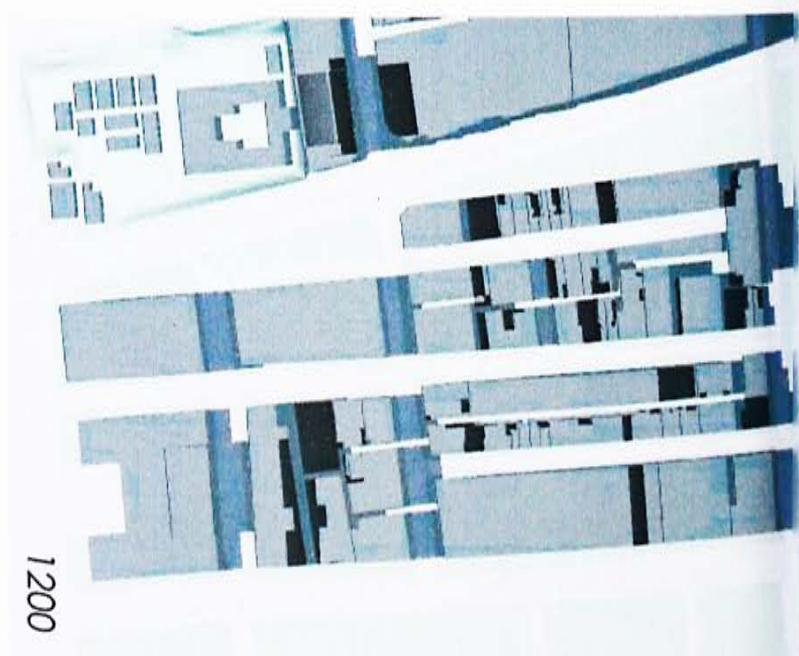
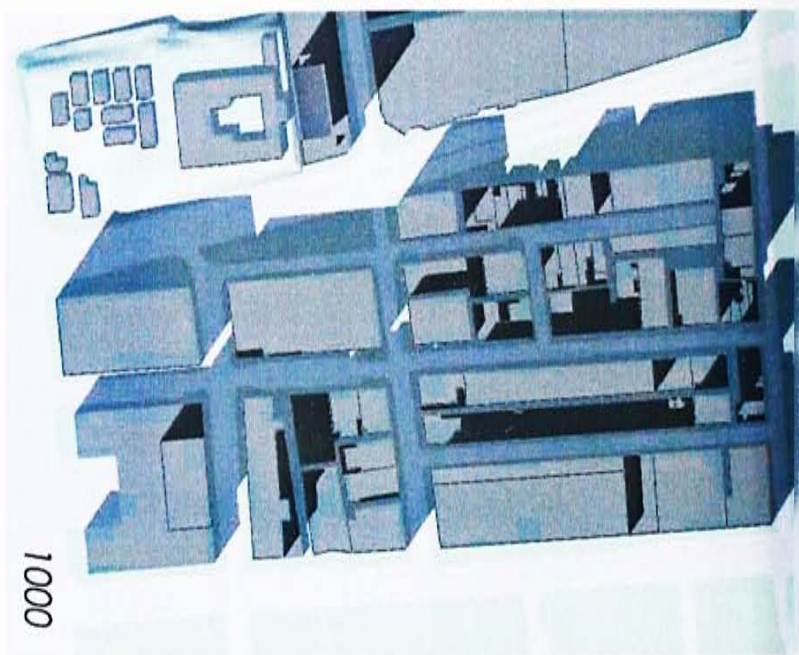
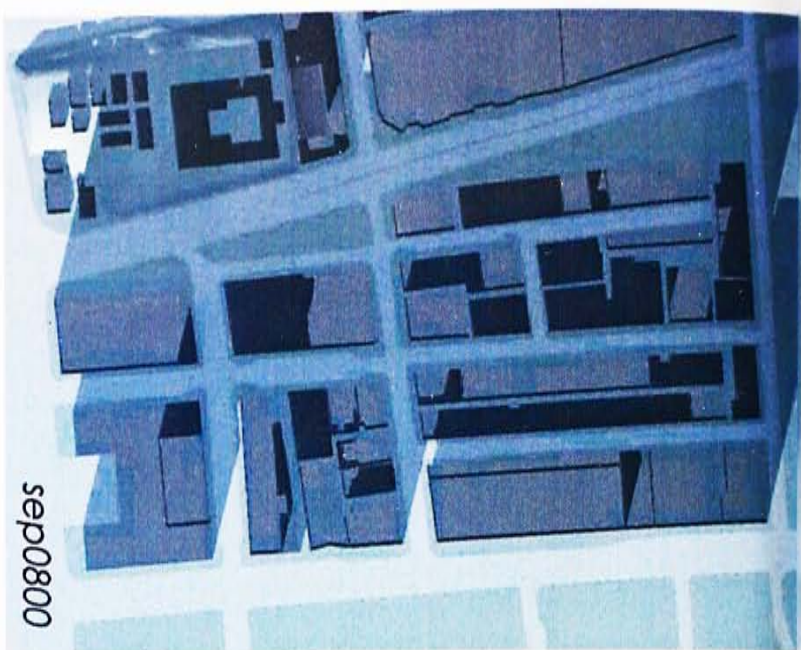


1800

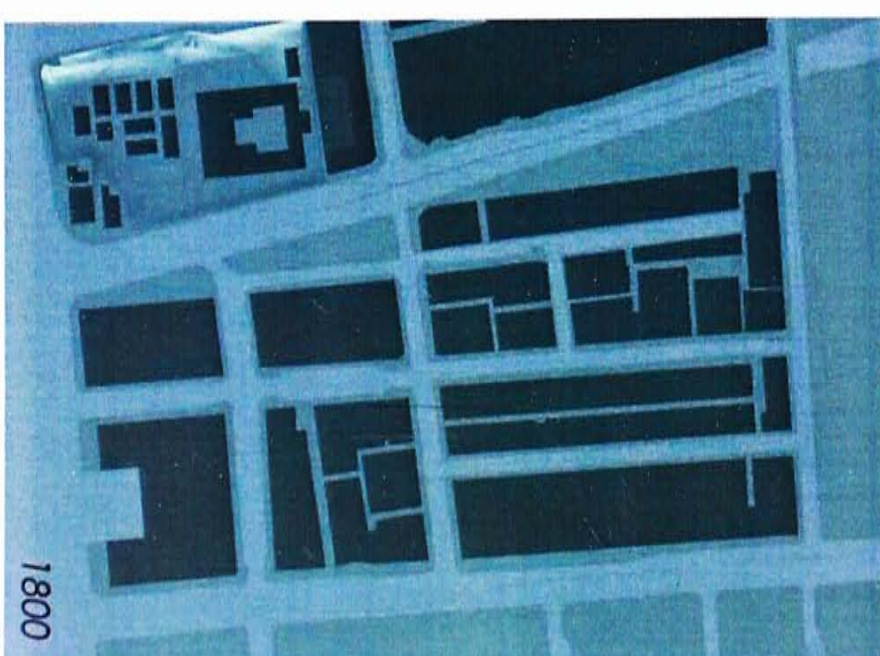
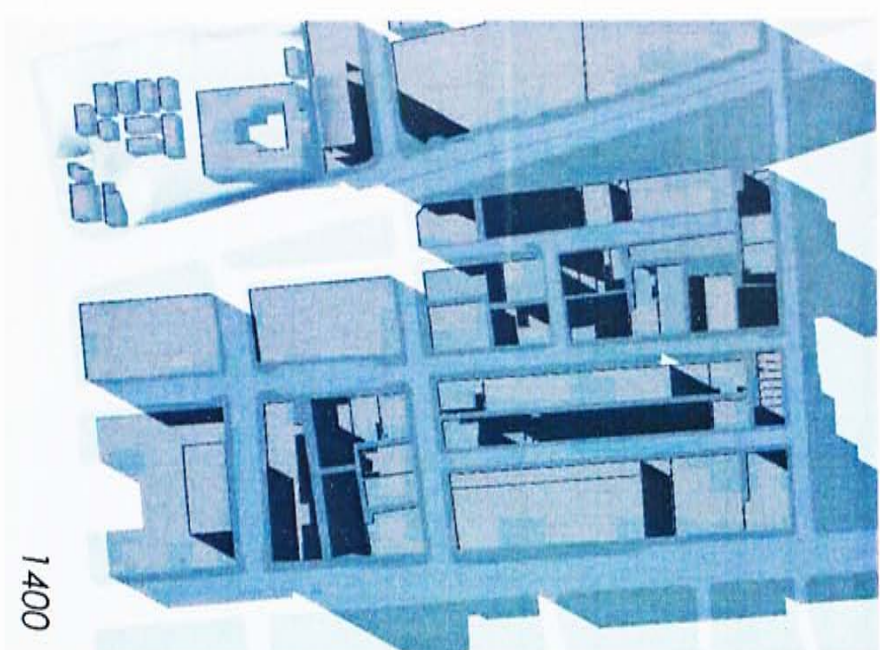
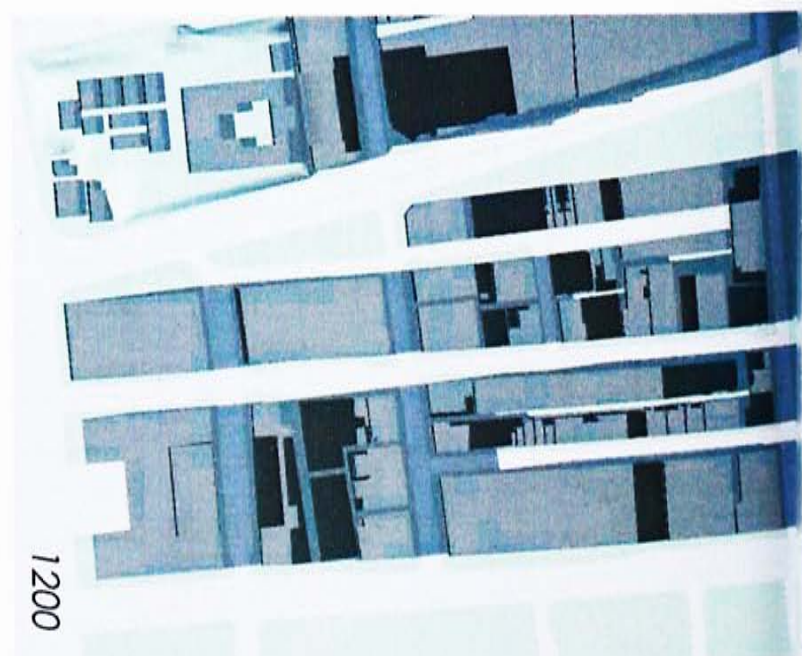
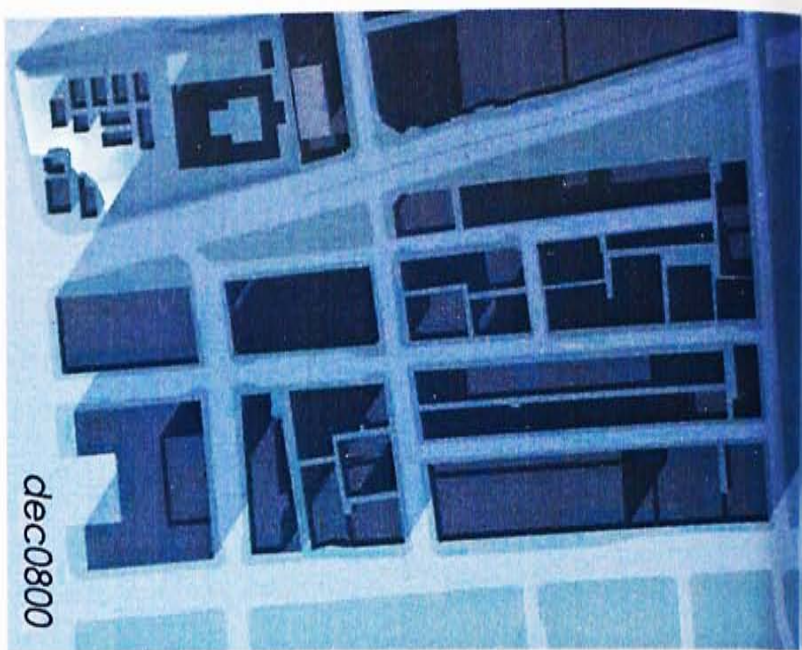


1200



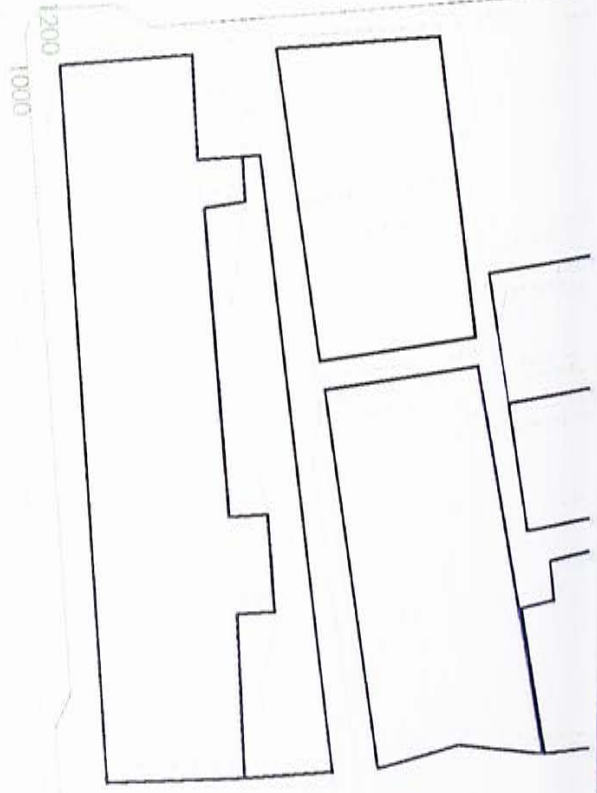
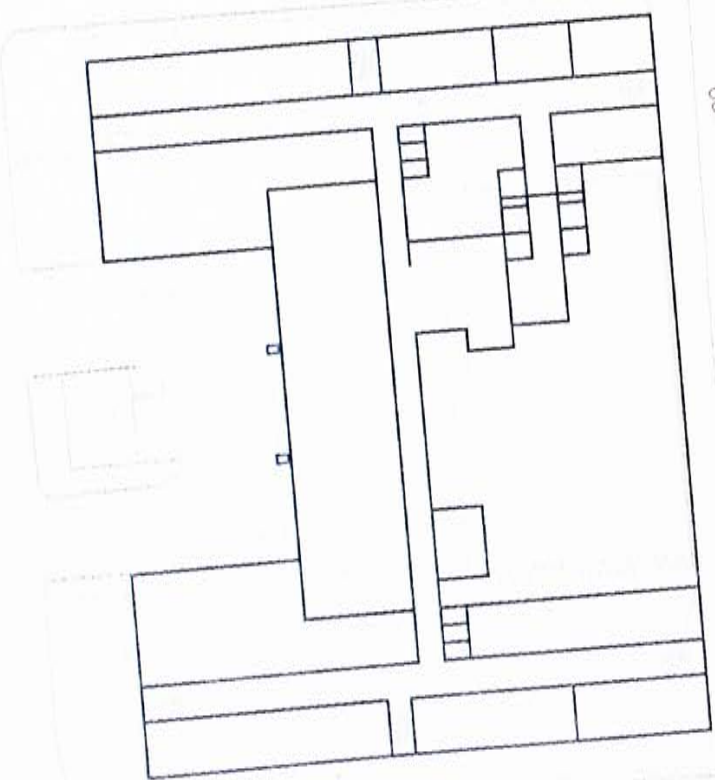
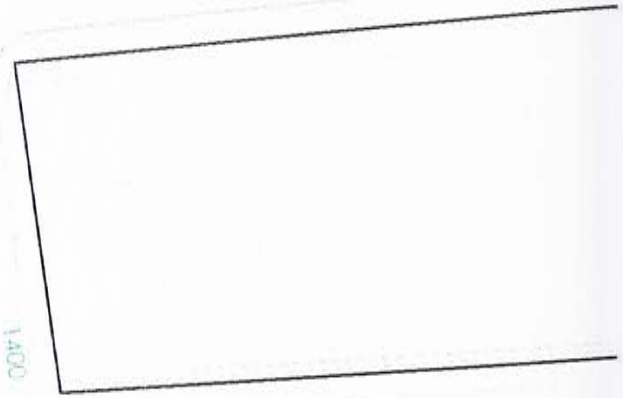
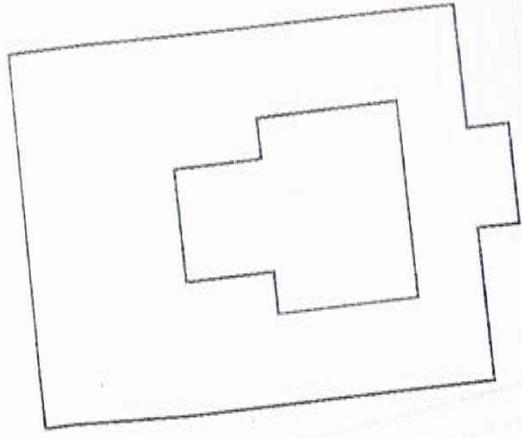
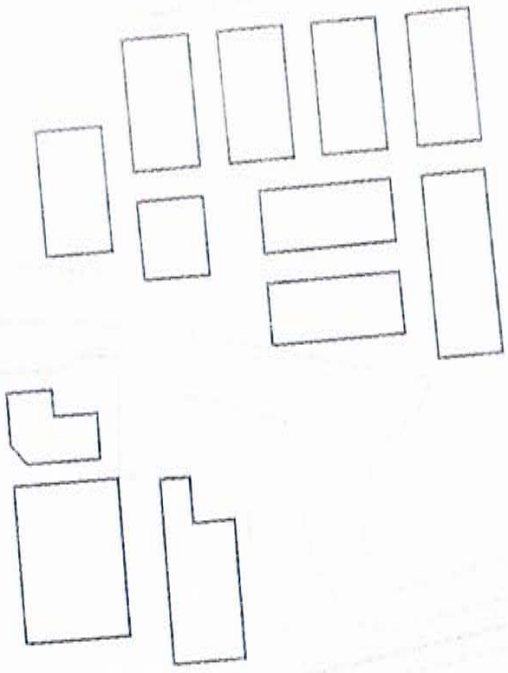








Shadow lines in summer



1800

1600

1400

1300

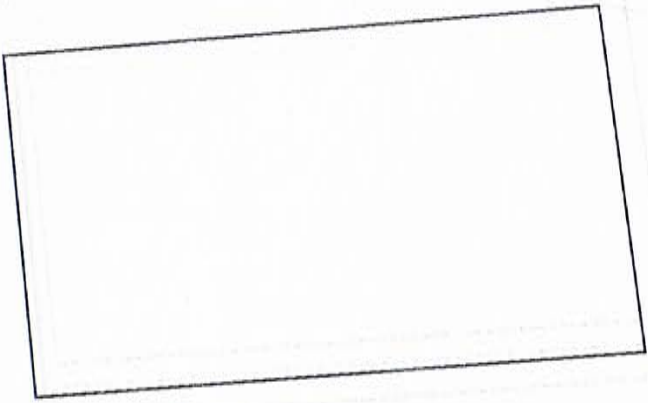
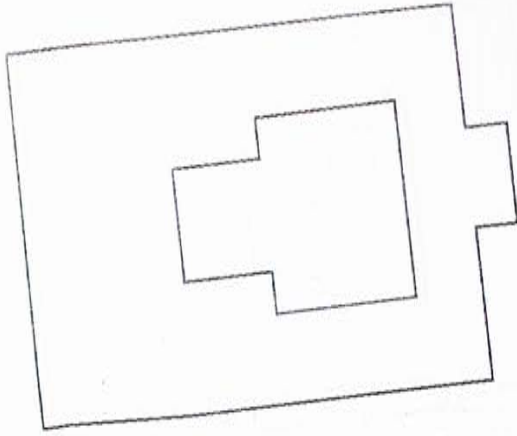
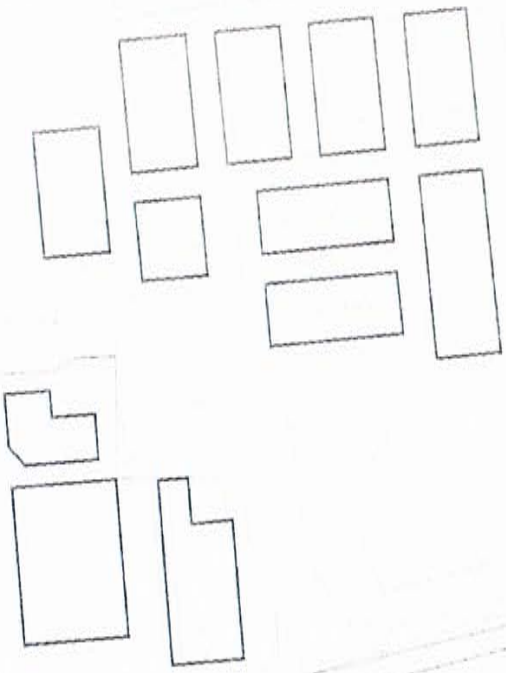
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1000

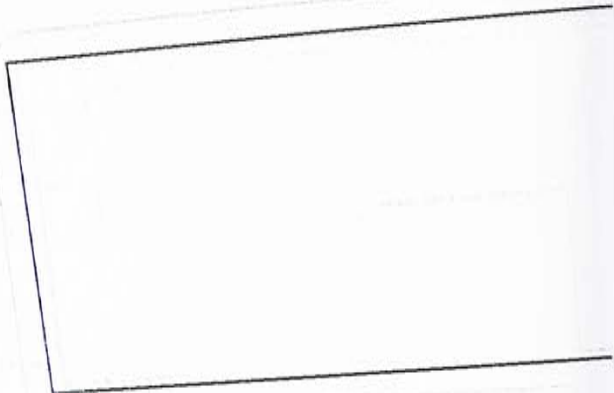
0800



Shadow lines in winter

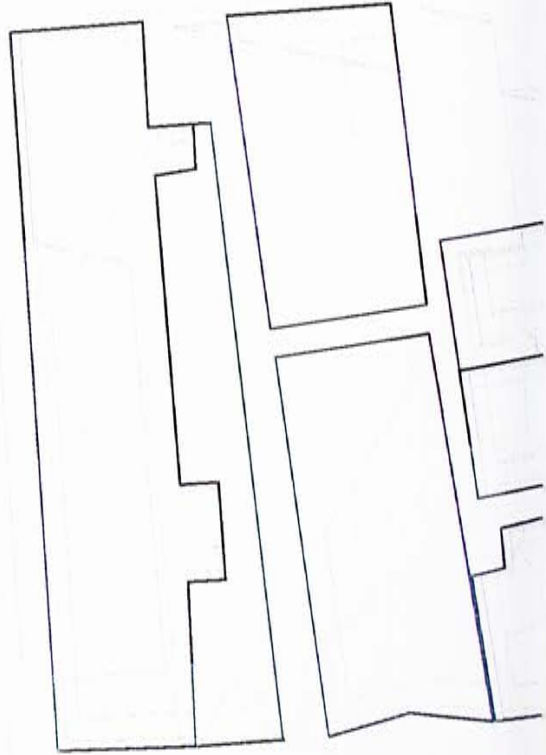
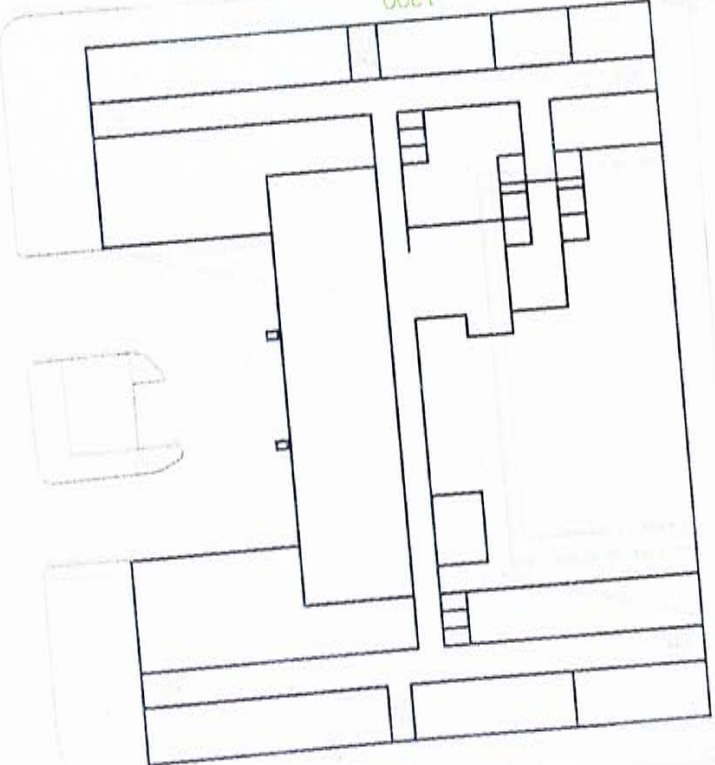


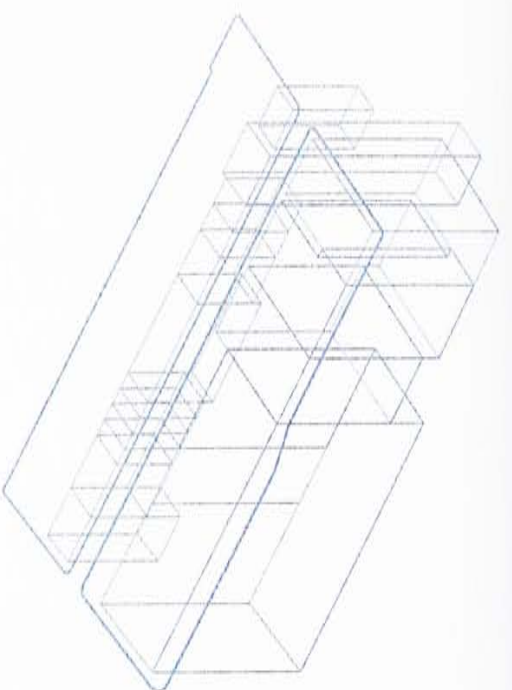
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1400  
1500



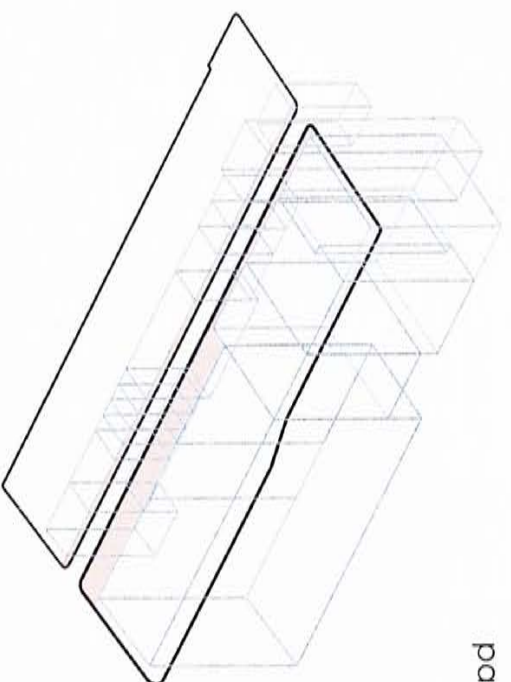
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1000

1200

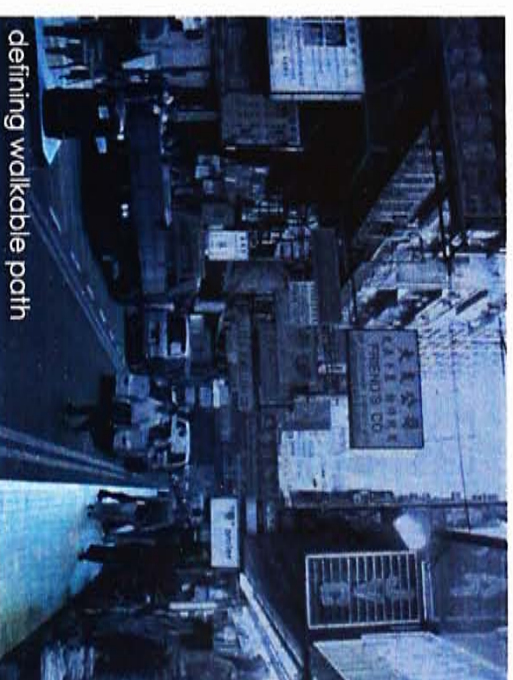
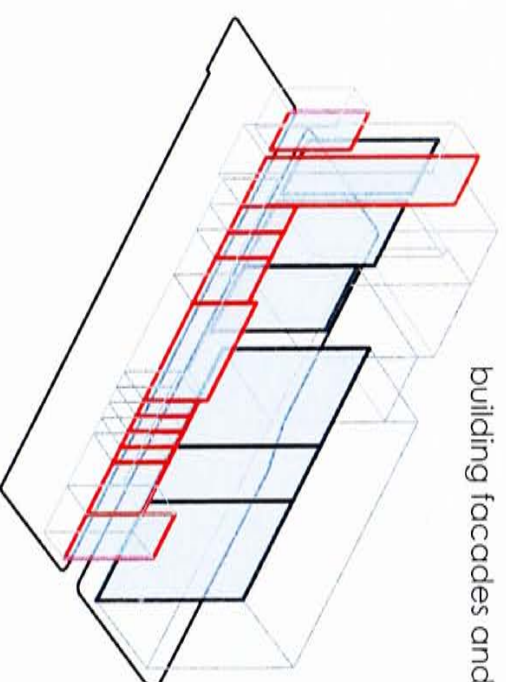




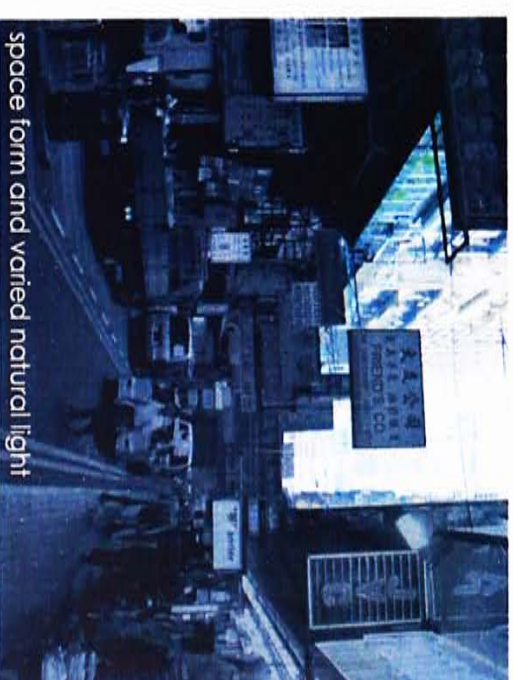
pavement



building facades and heights

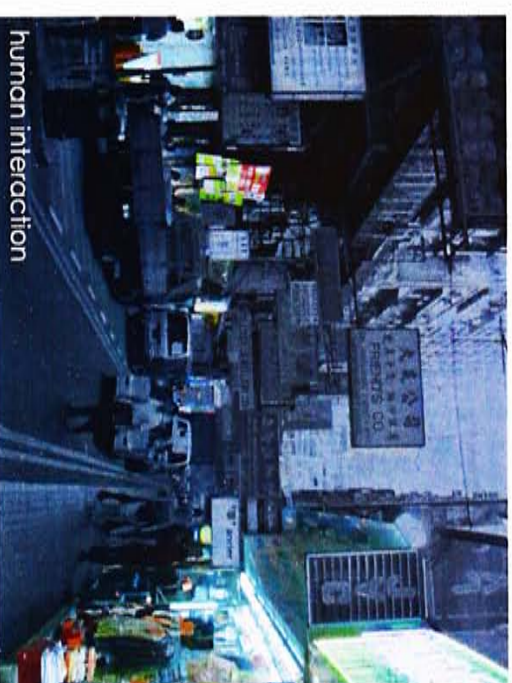
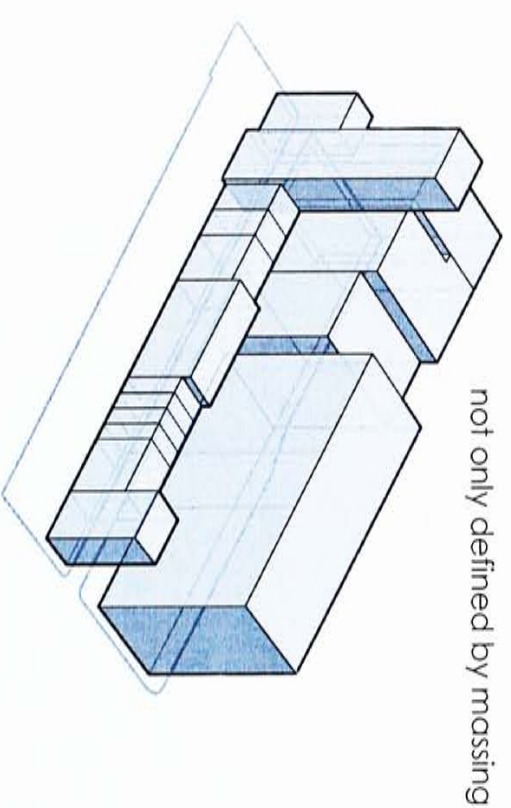
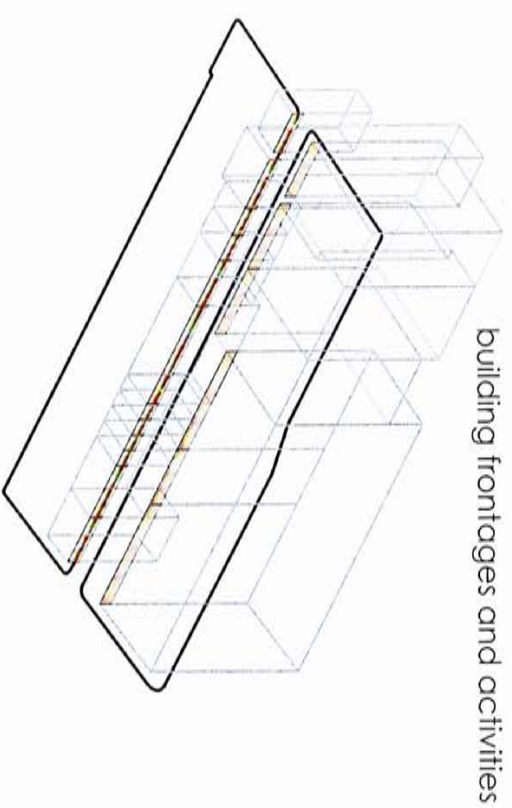
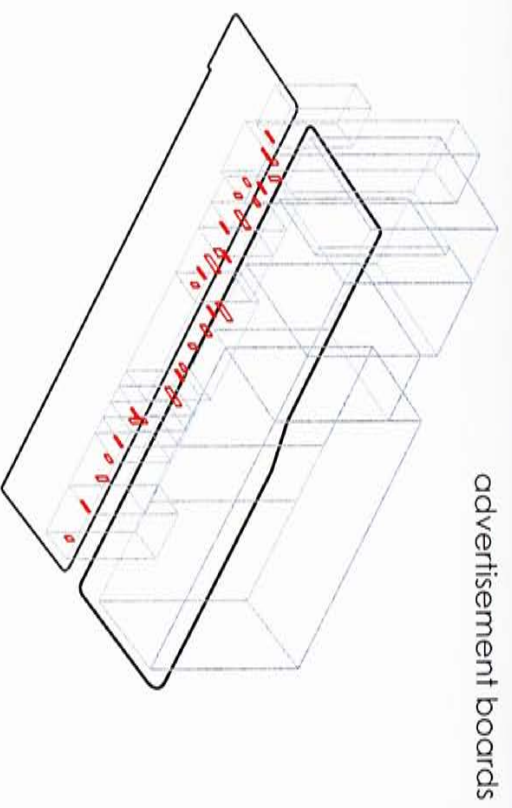


defining walkable path



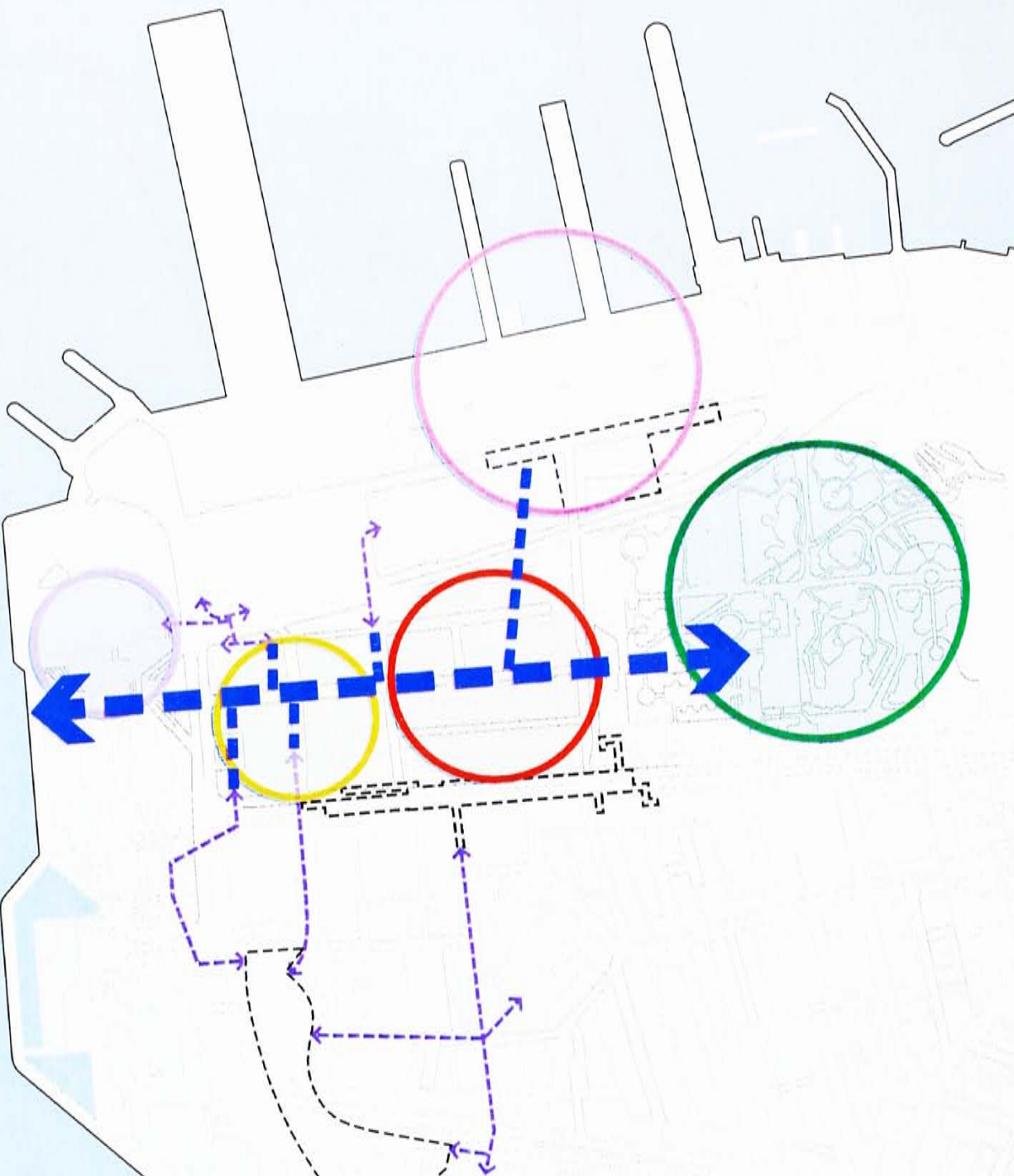
space form and varied natural light







## 5\_Statement Invisible Dynamics



The place for relaxation and gathering is needed in our congested city. Due to the unpleasant, limited and vehicle-oriented situation on the ground, the possibilities of making a public space in the subterranean (invisible) level were explored in this thesis. The underground space can serve like a "square" rather than a lifeless subway only.

Physically, dynamics refers to the movement of people. A underground network is established to connect different places in the city. People can move freely from place to place without interfered by the vehicular traffic.

Spiritually, dynamics also refers to the even changing programs in the space. There is no definite program in the space. People come to the space casually or intentionally generating their own activities and defining the space. Thus, the events happened and people involved are always changing which promotes people encounter and enrich the experience.

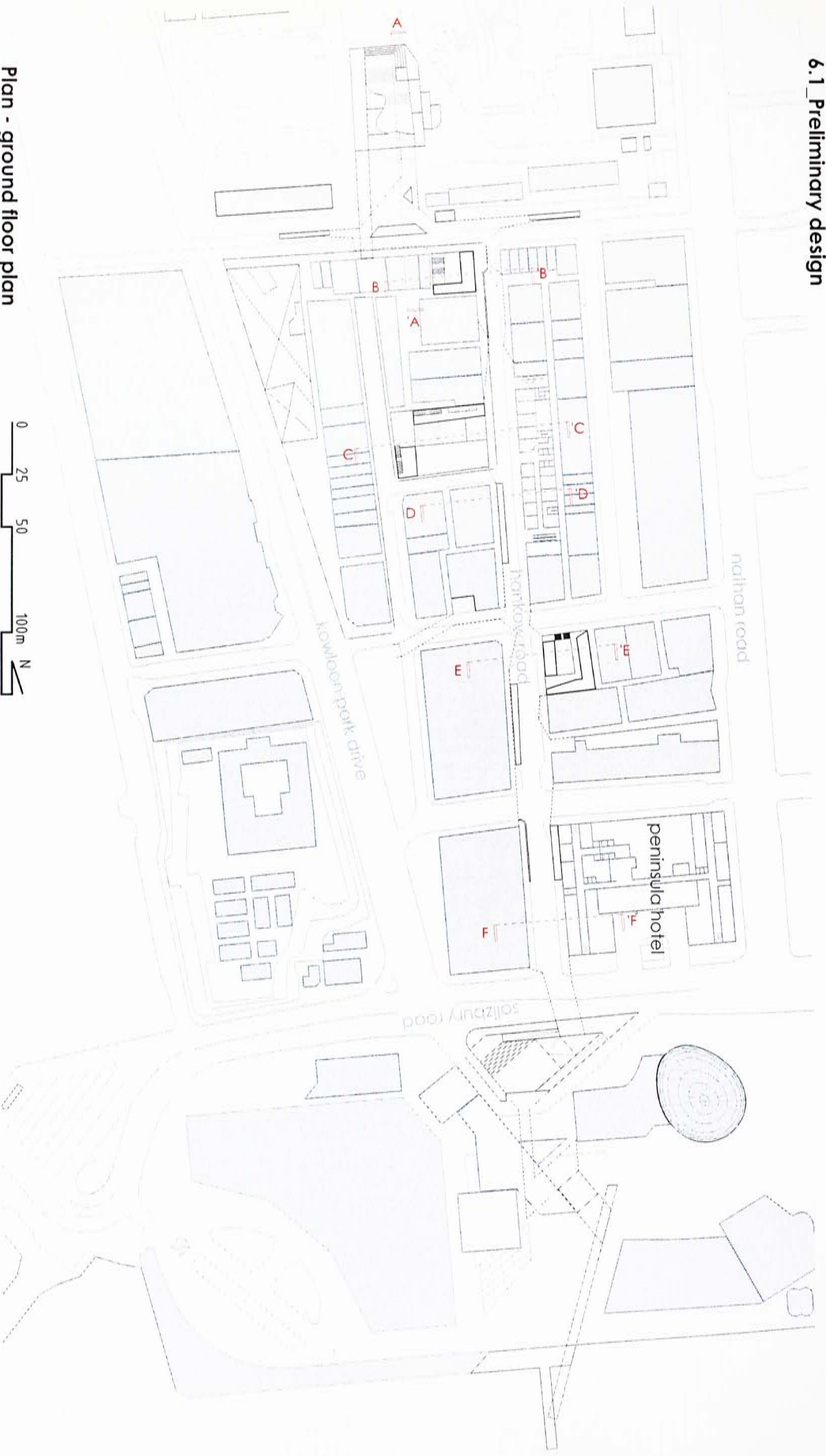
...my motivations is the unlimited creative potential that I see in the idea of 'invisible architecture', which enables us to design continuous space without any apparent form. The question of essential space is the main issue. To my mind, working on underground space links up with the search for the 'origins of architecture'.

Tadao Ando



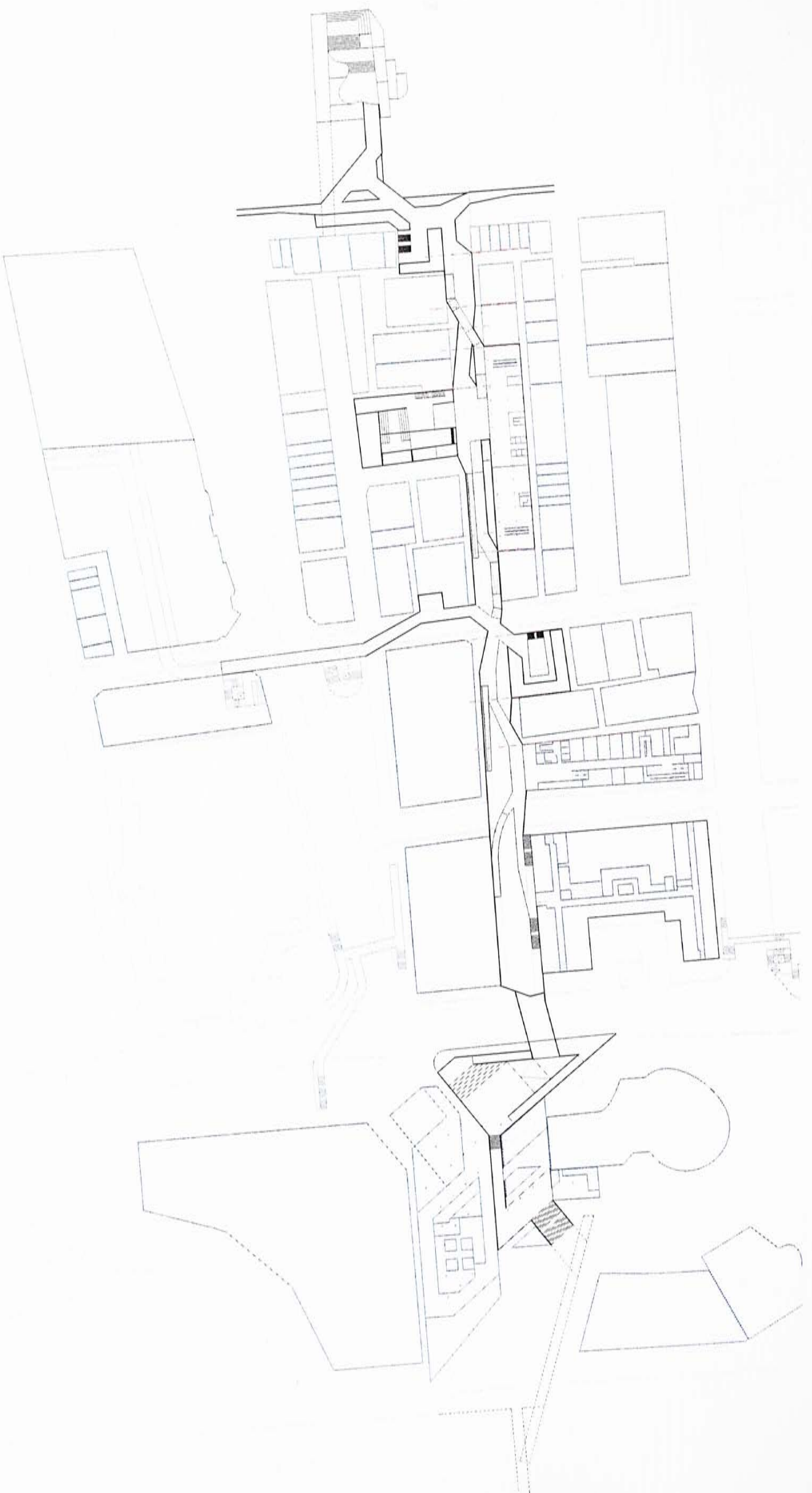
# 6\_Design development

## 6.1\_Preliminary design



Plan - ground floor plan

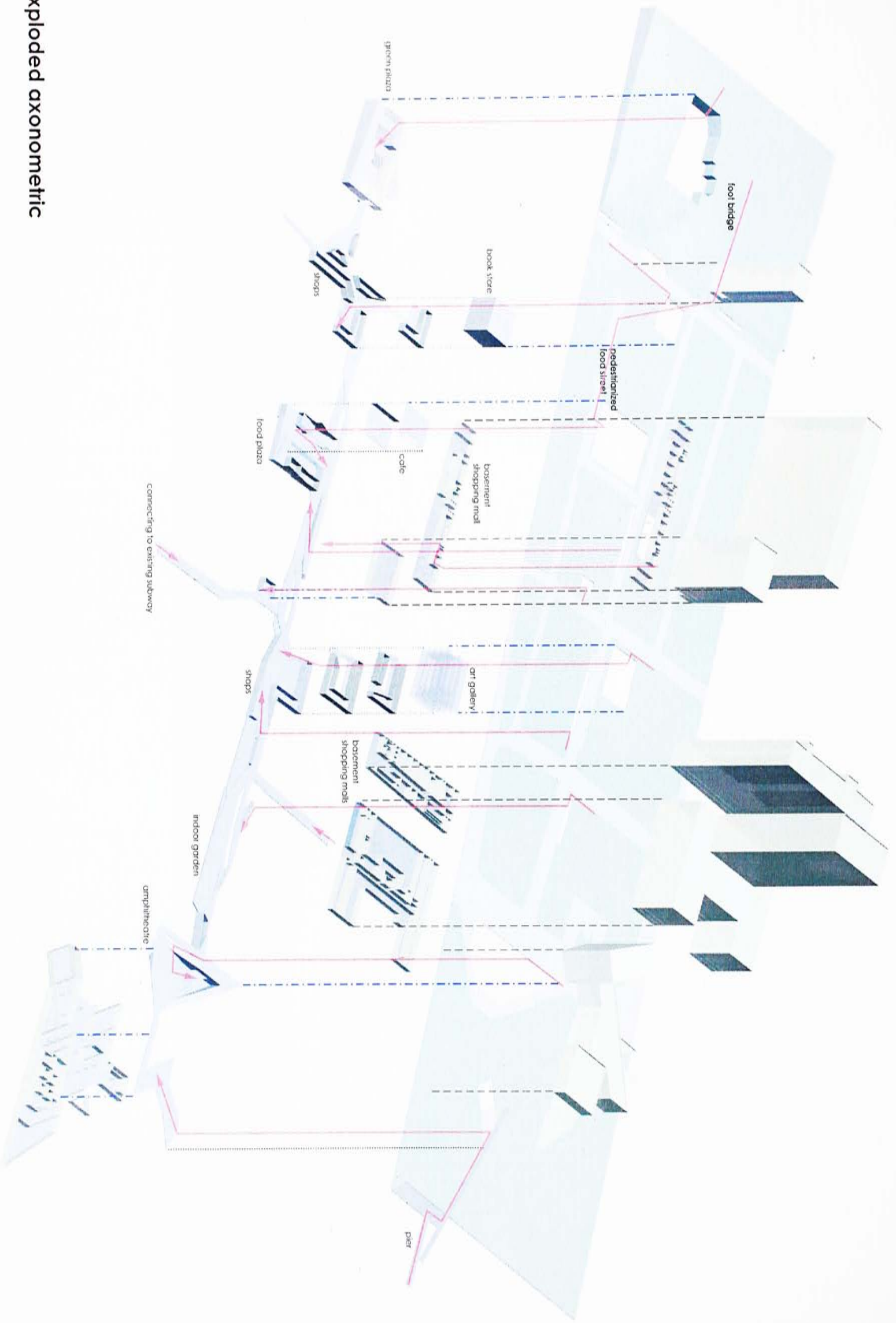
Plan - basement first floor plan





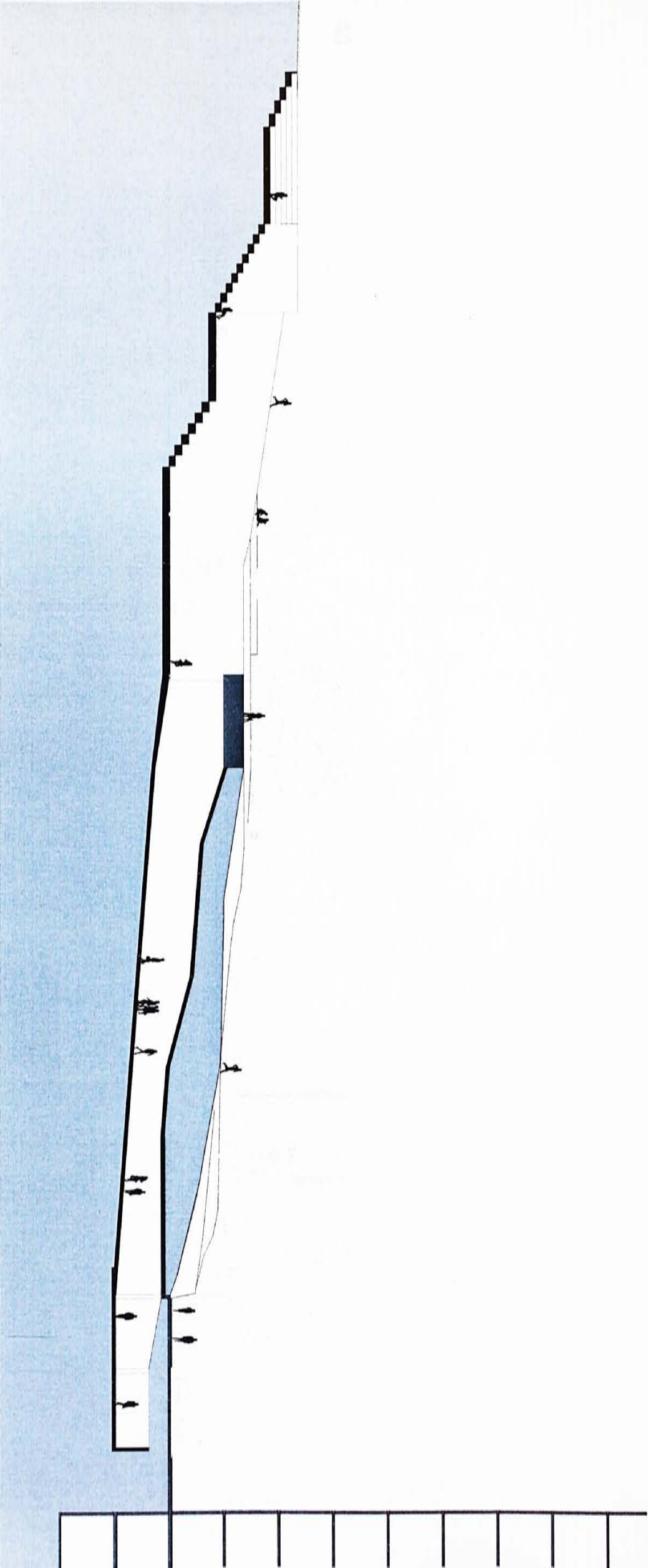
Plan - basement second floor plan





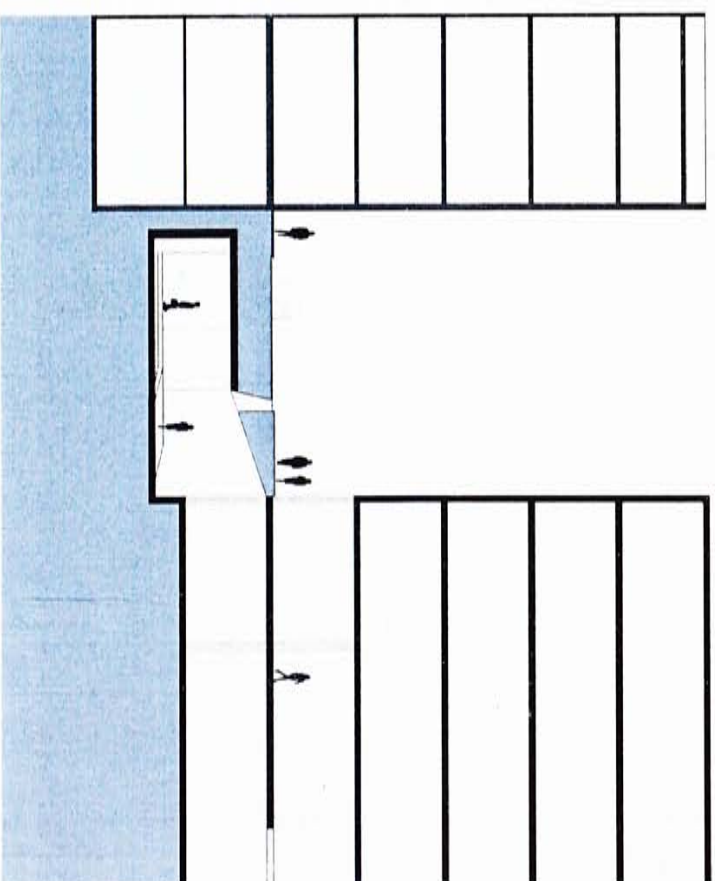
Exploded axonometric





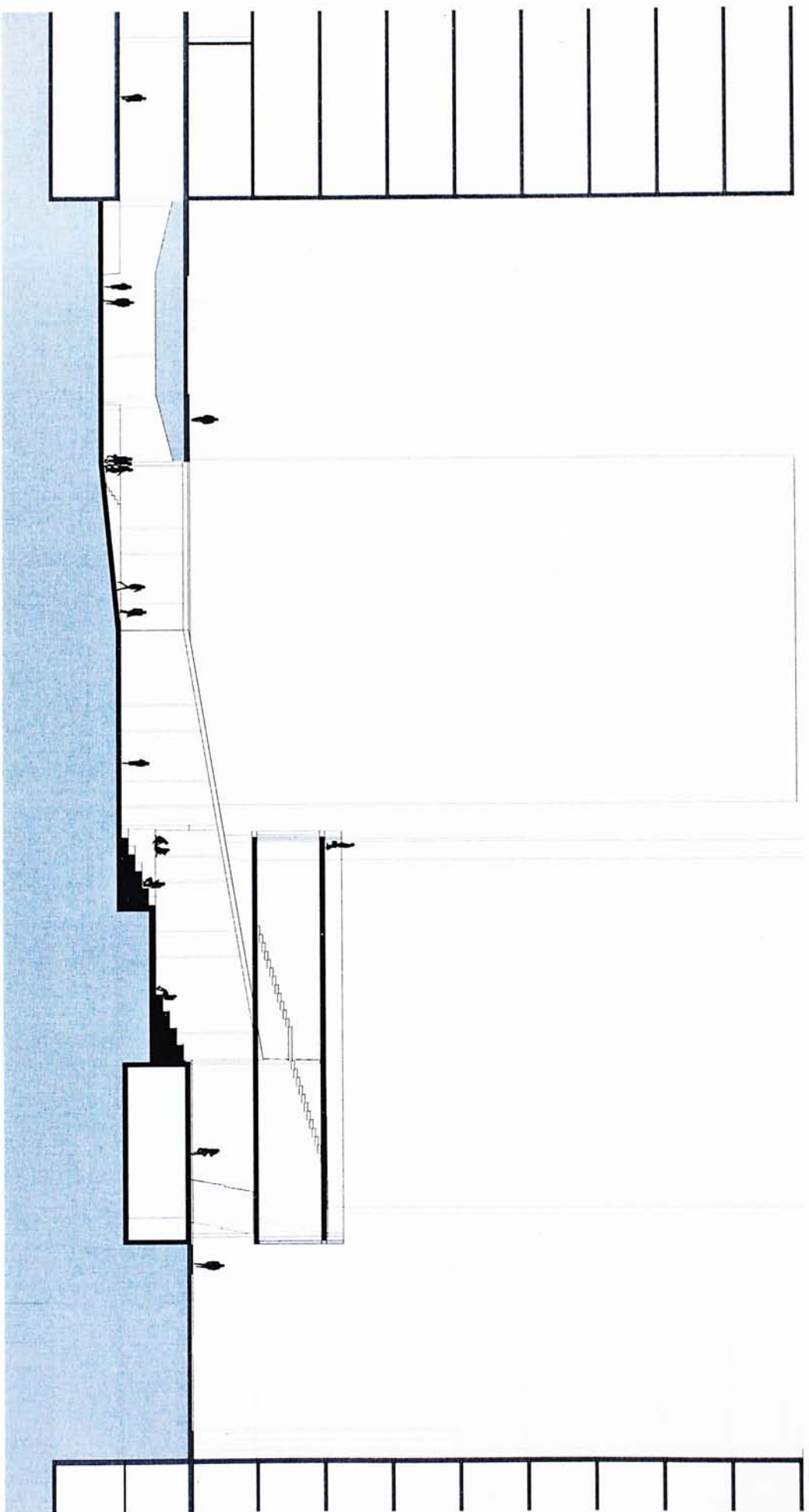
Section AA'



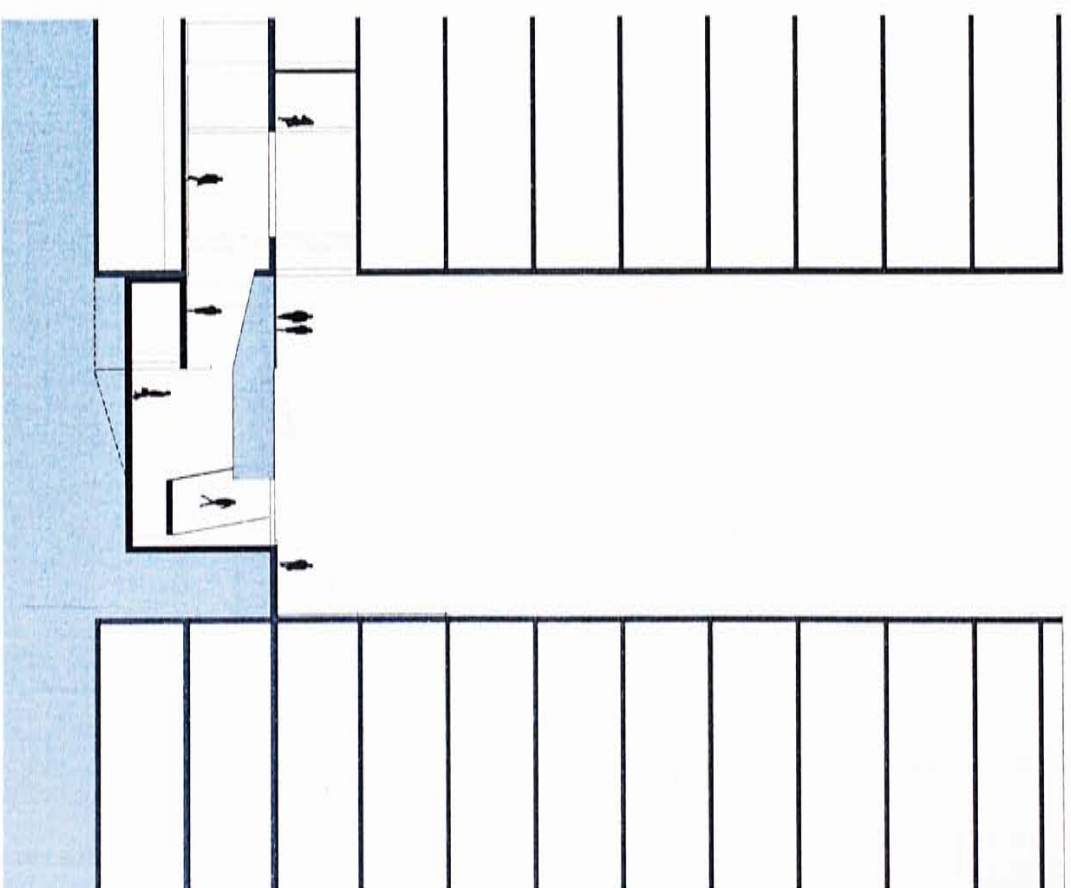


Section BB'



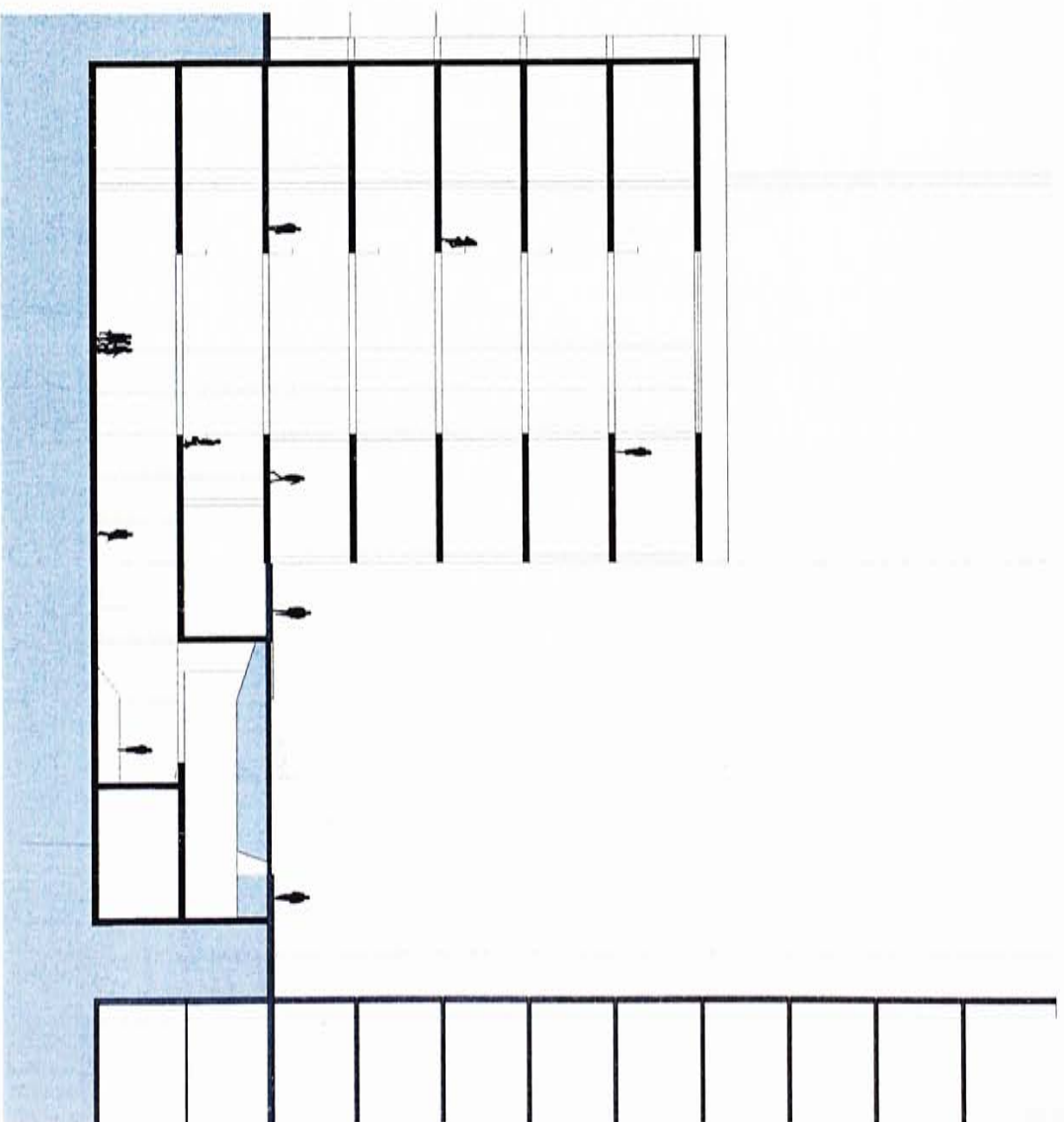


Section CC'

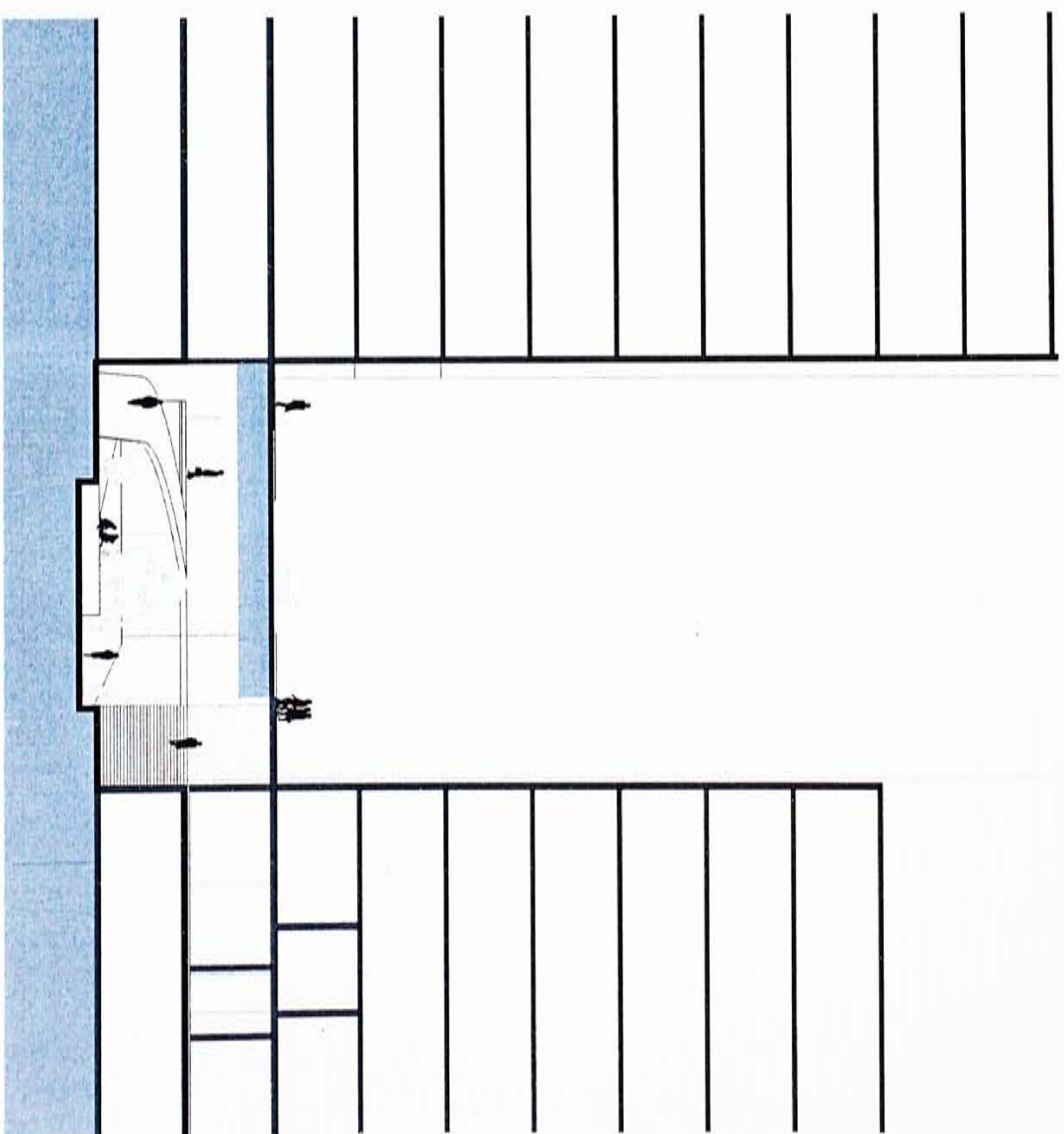


Section DD'



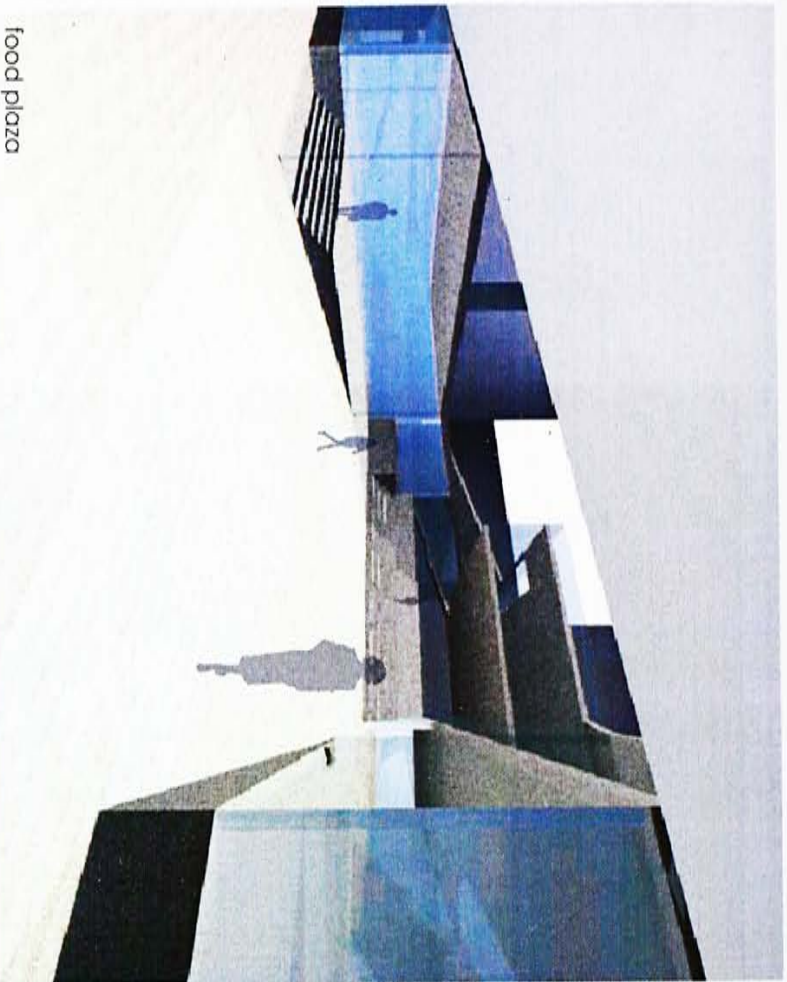


Section EE'



Section FF'





food plaza

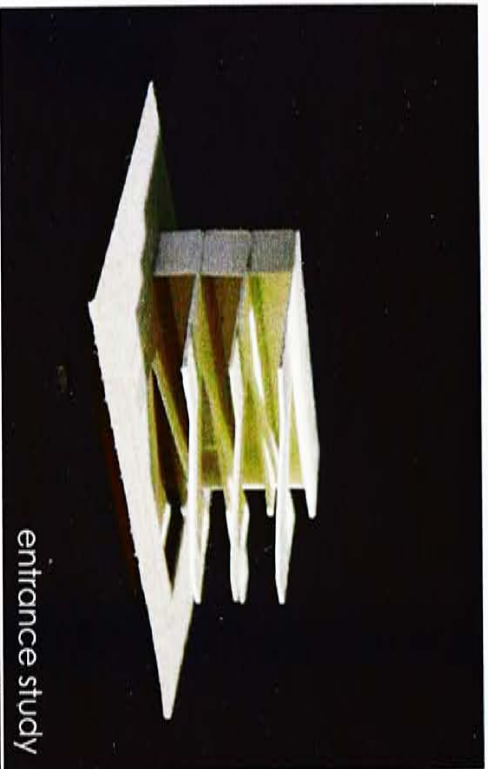
basement shopping mall



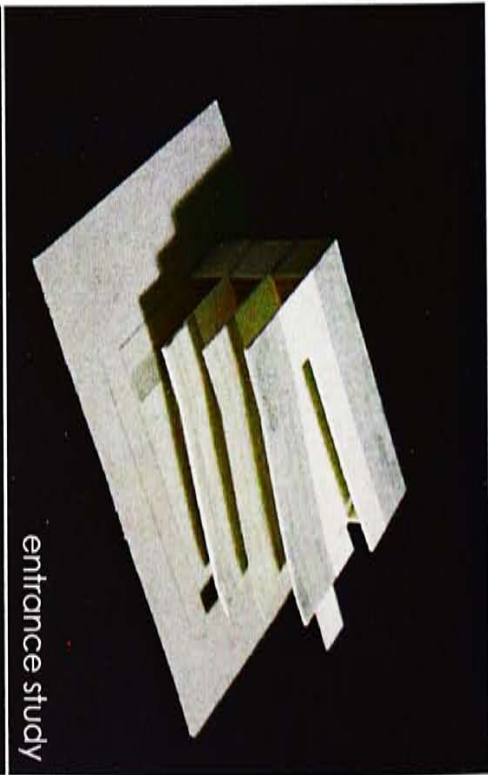
art gallery

indoor garden

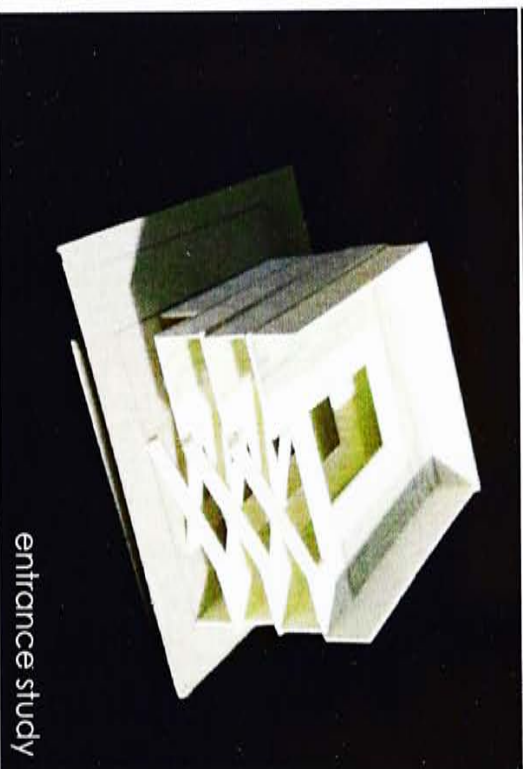




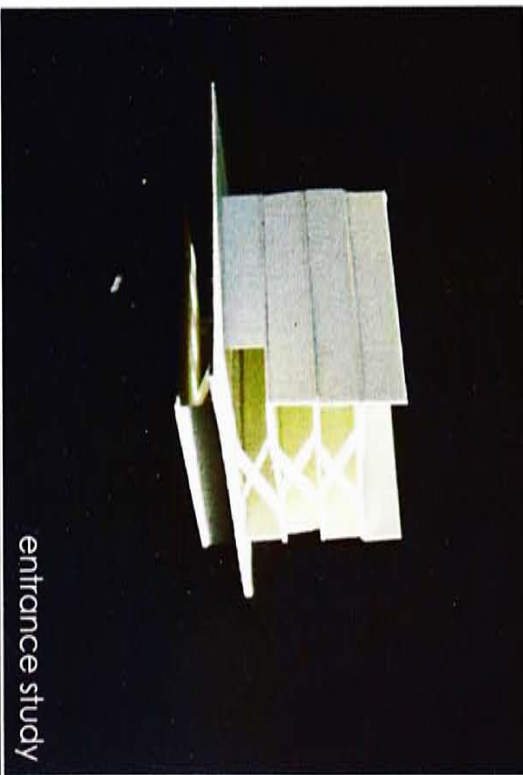
entrance study



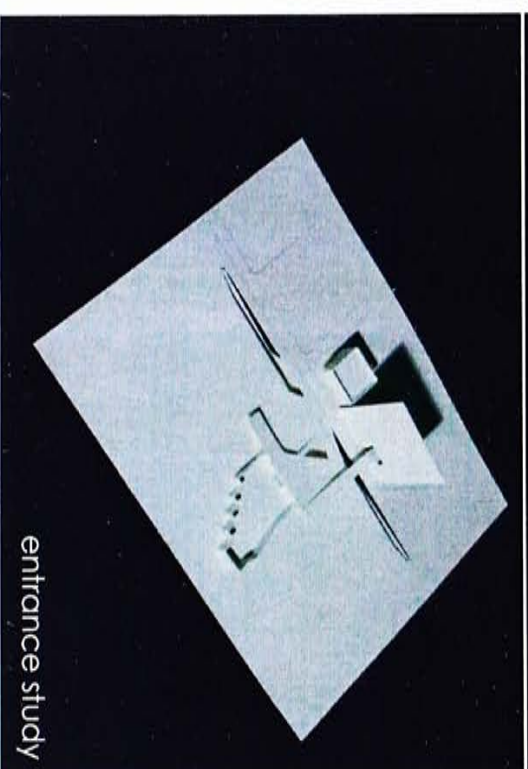
entrance study



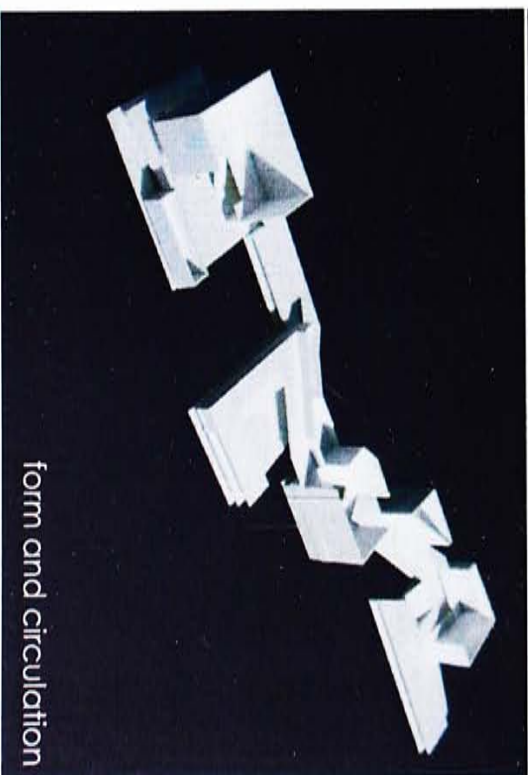
entrance study



entrance study



entrance study



form and circulation



## 6.2\_Museum design



Aboveground pedestrian flow

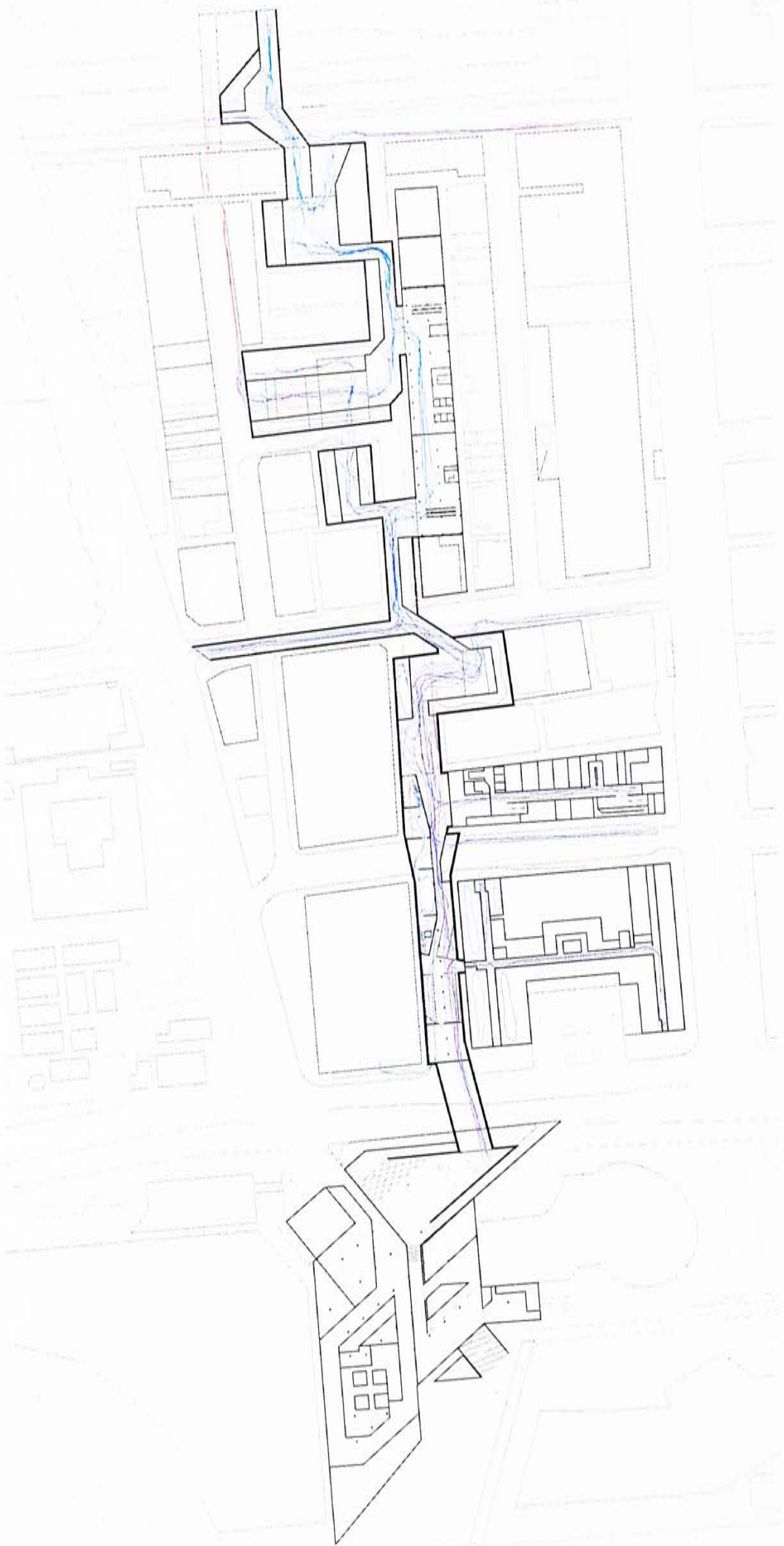
Existing circulation

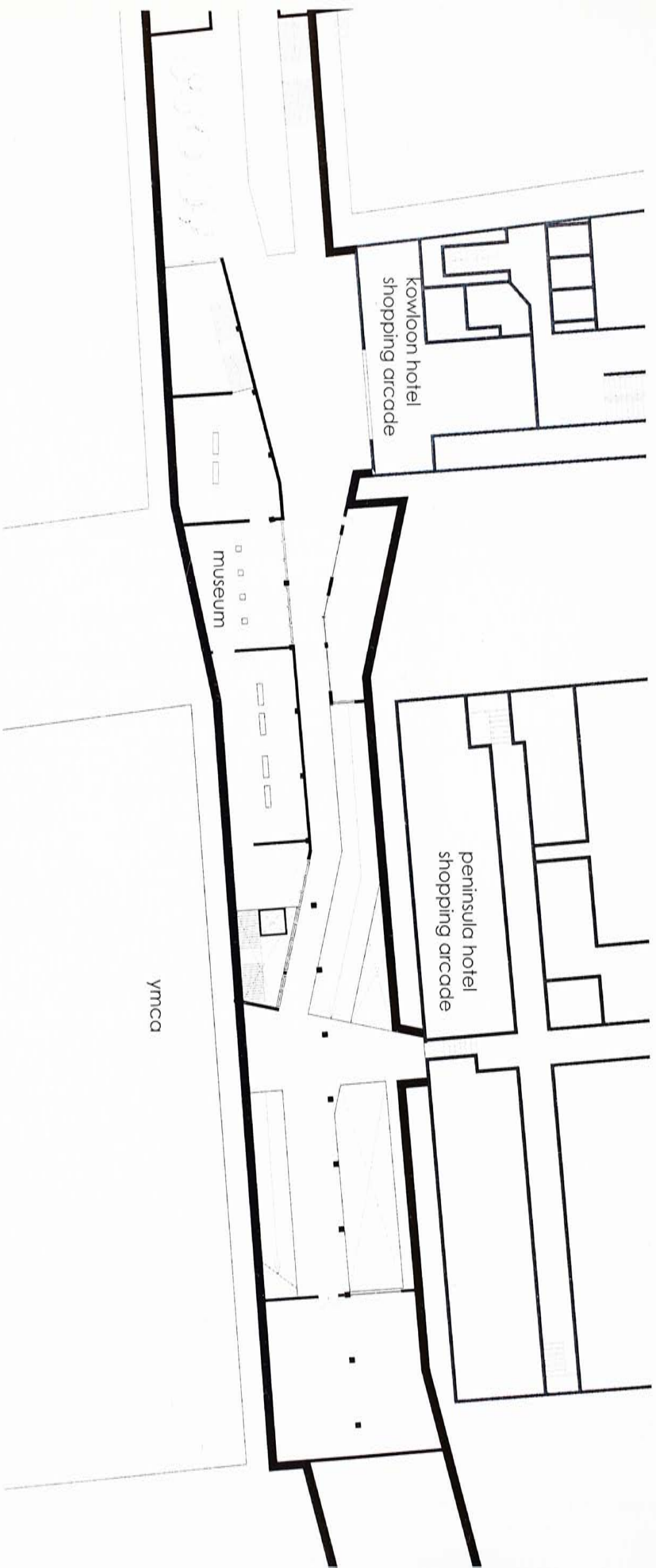




Aboveground pedestrian flow  
Underground pedestrian flow

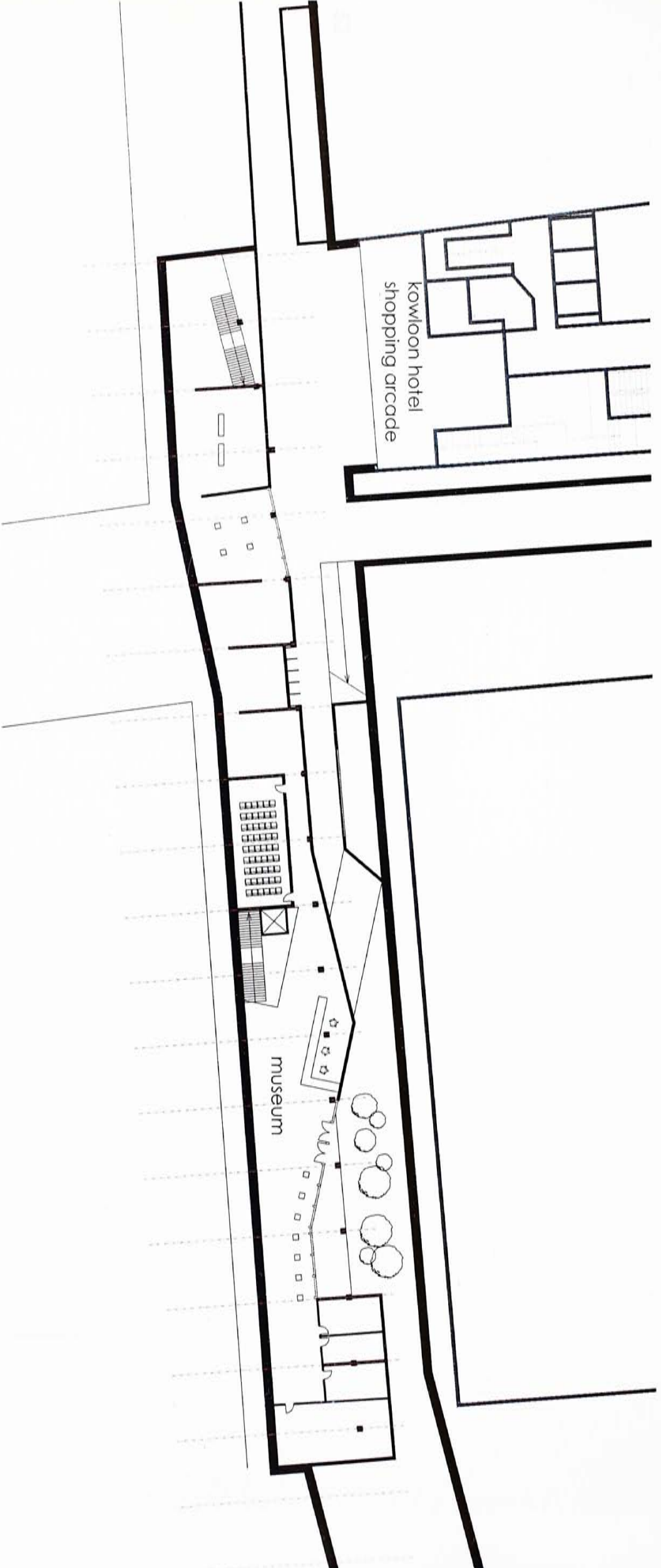
Proposed circulation



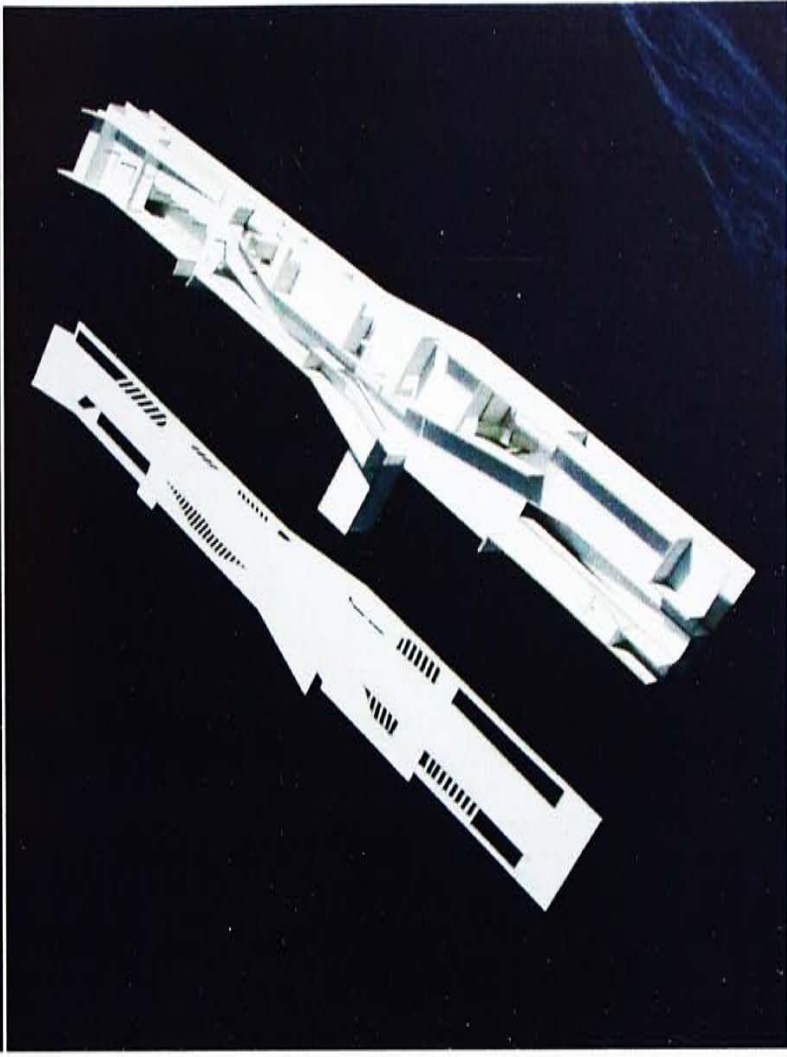
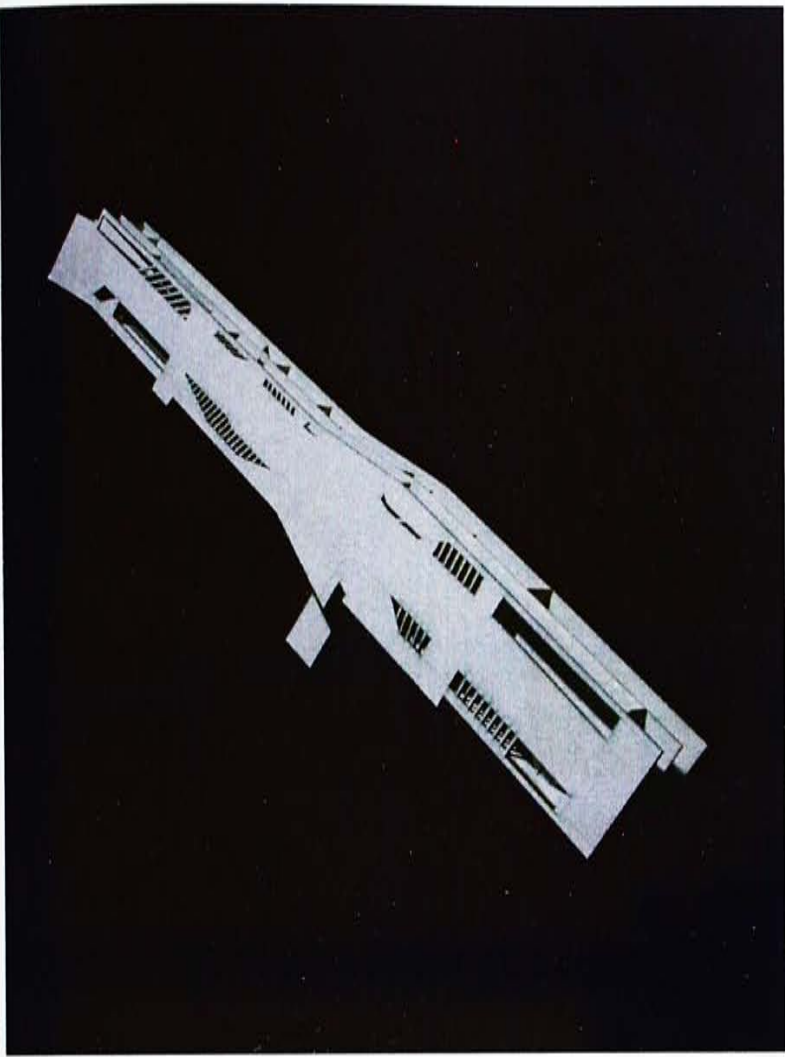


First basement plan





Second basement plan



Study model





Study model

6.3\_Fianl design



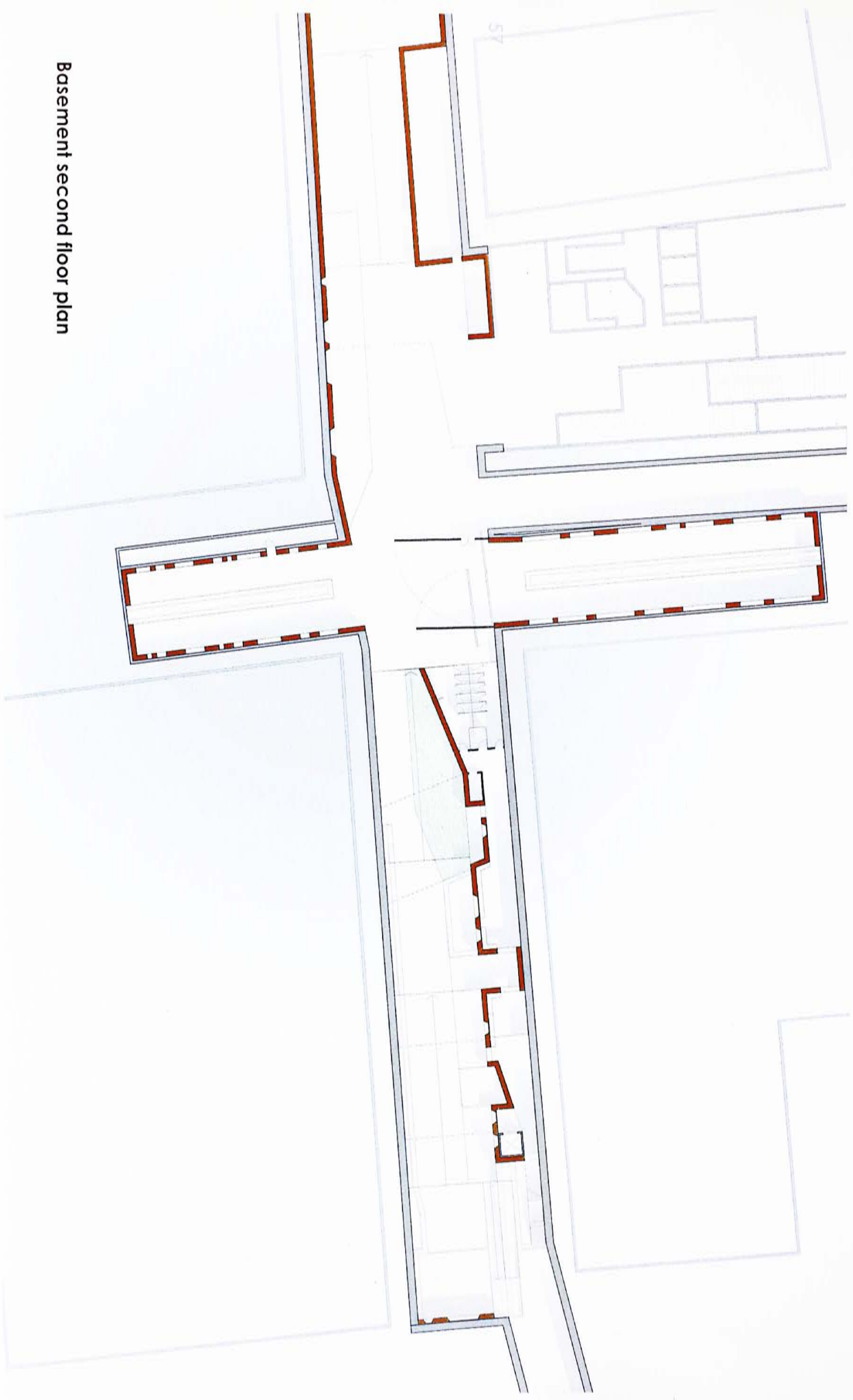
Ground floor plan



Basement first floor plan



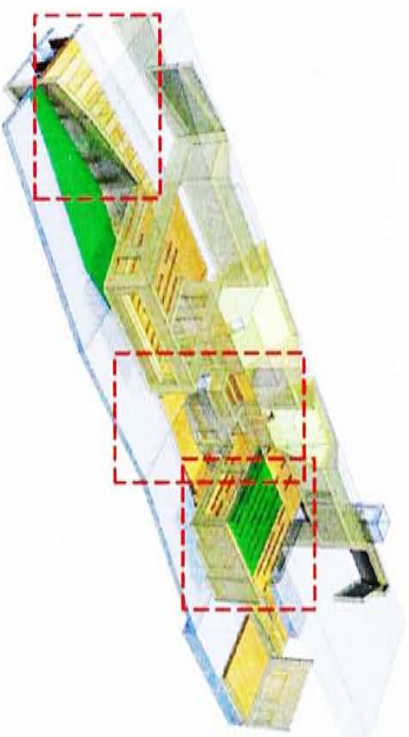
Basement second floor plan



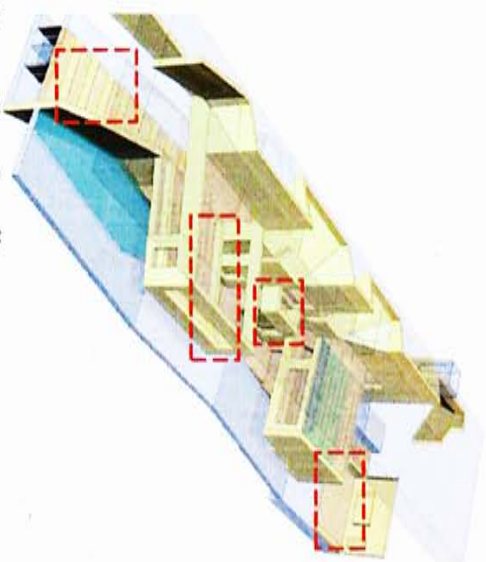




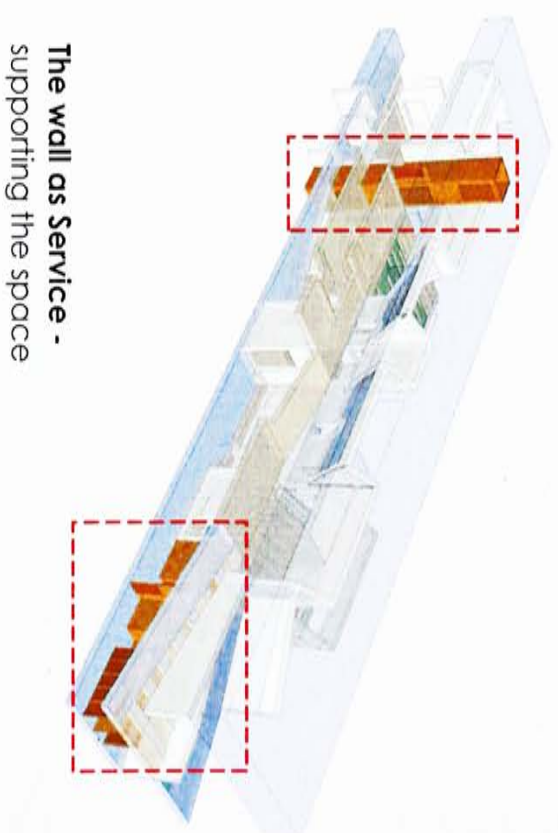
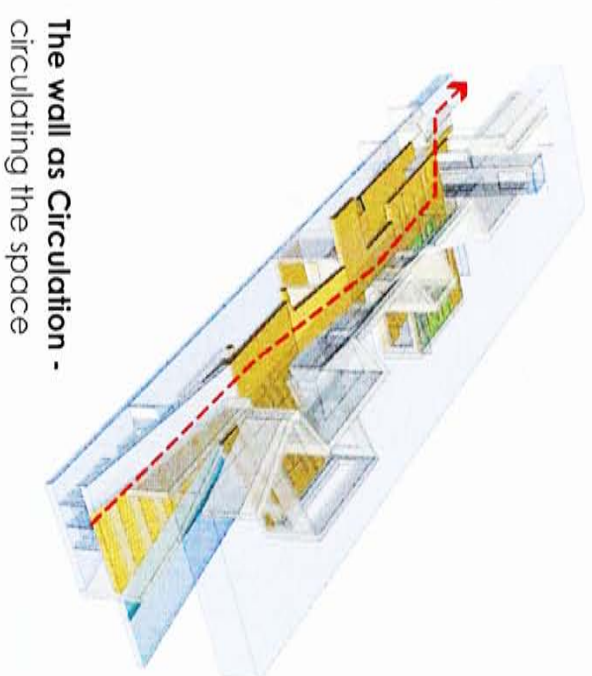
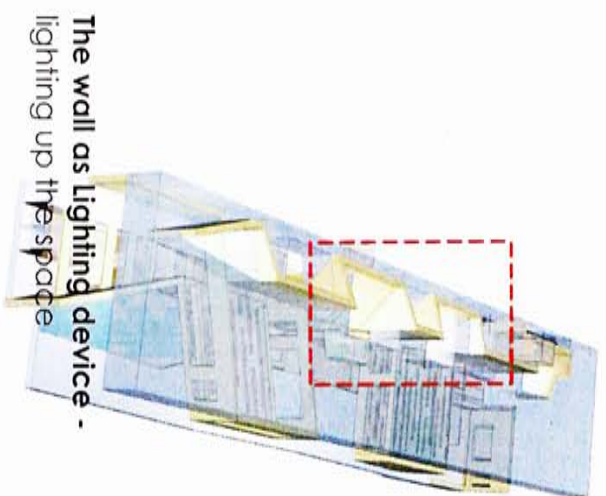
**The activity inducer**



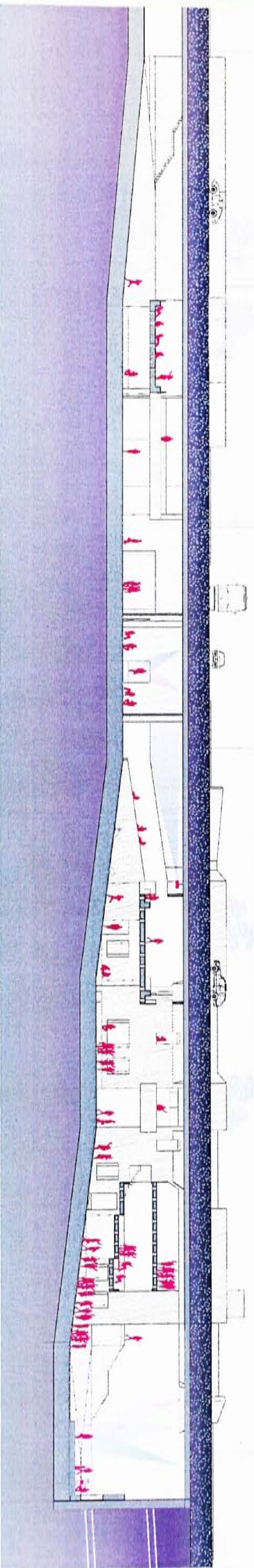
**The wall as Spatial partition -  
defining semi-private and public space**



**The wall as Furniture -  
vitalizing the space**

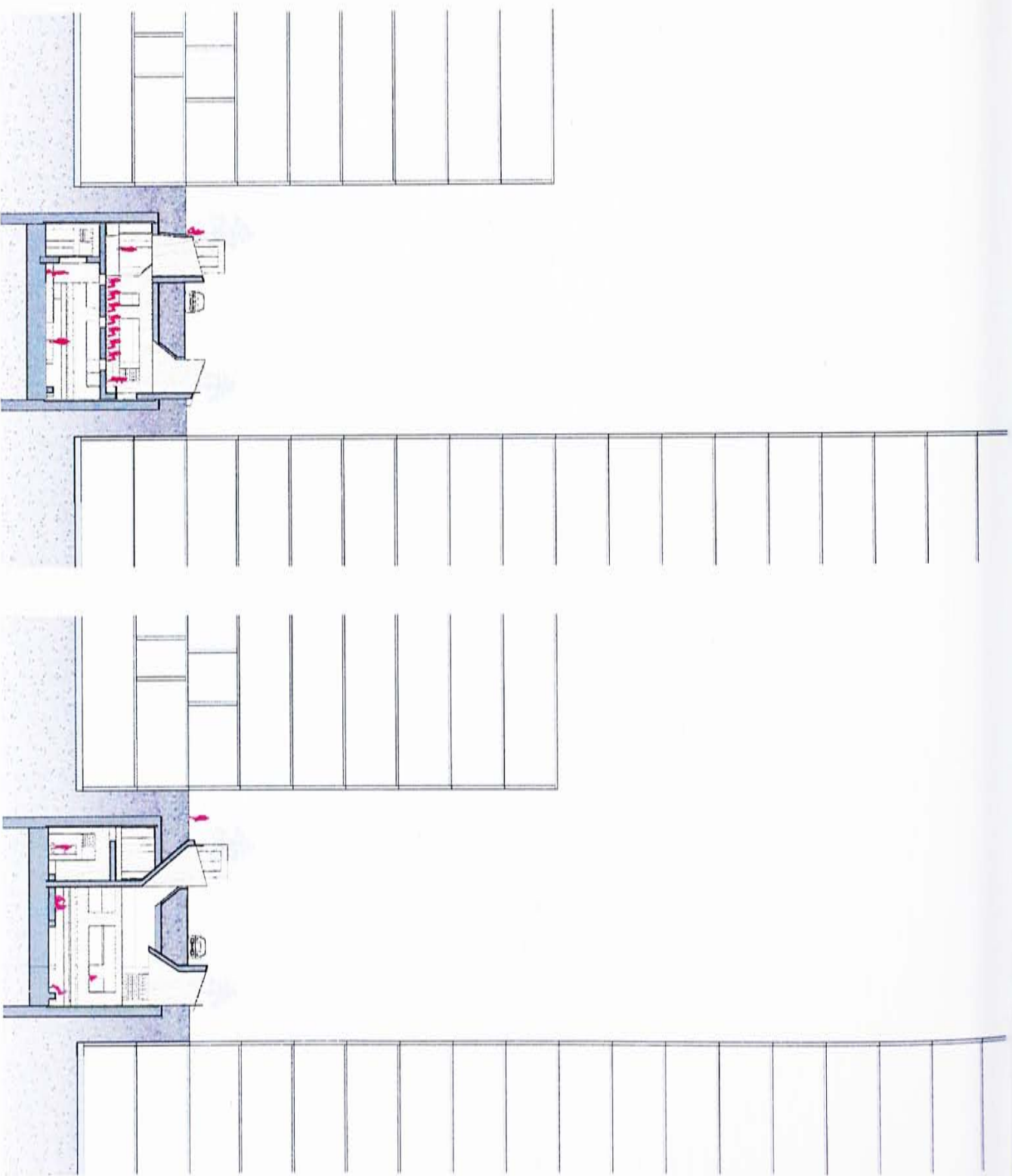






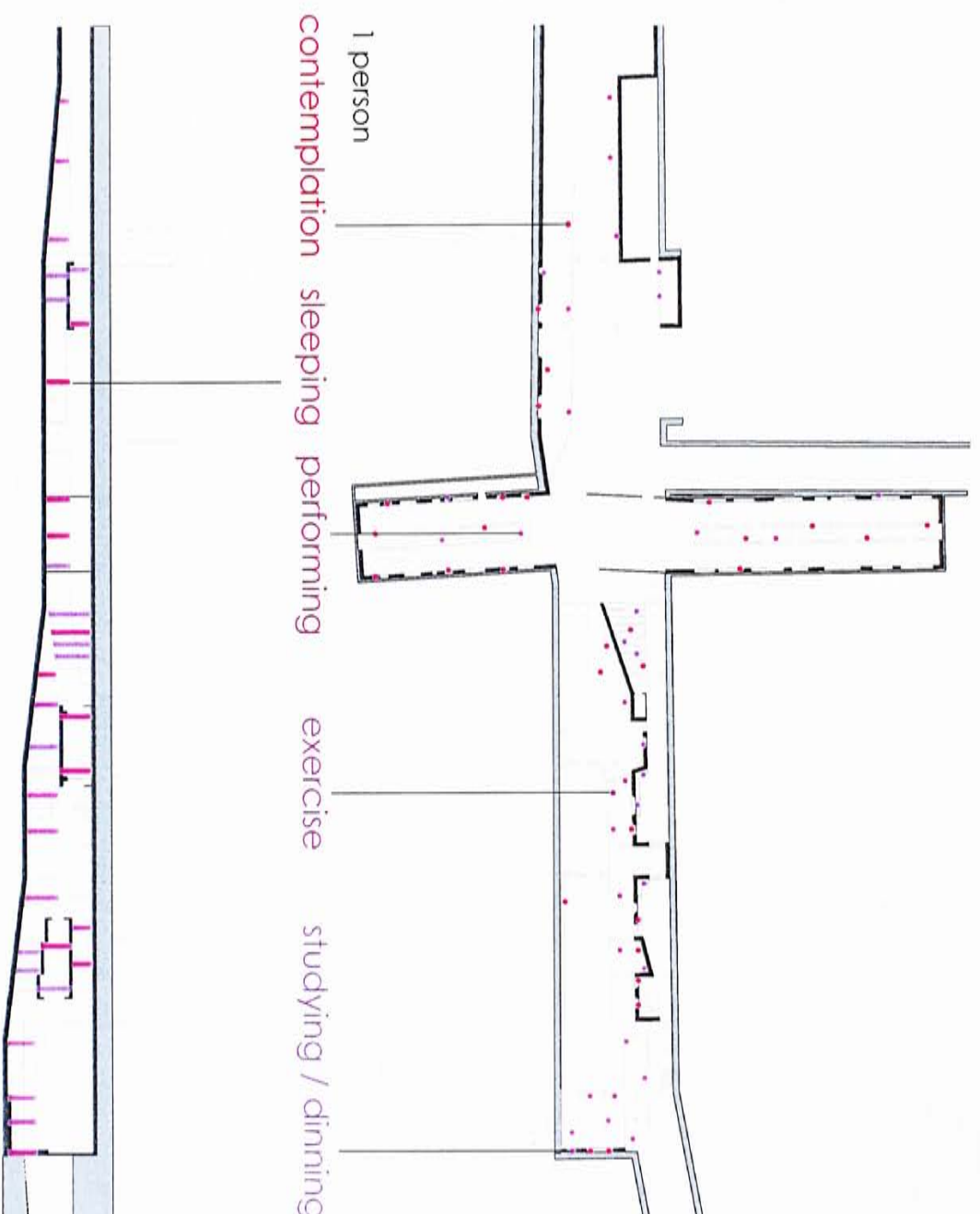
Longitudinal section



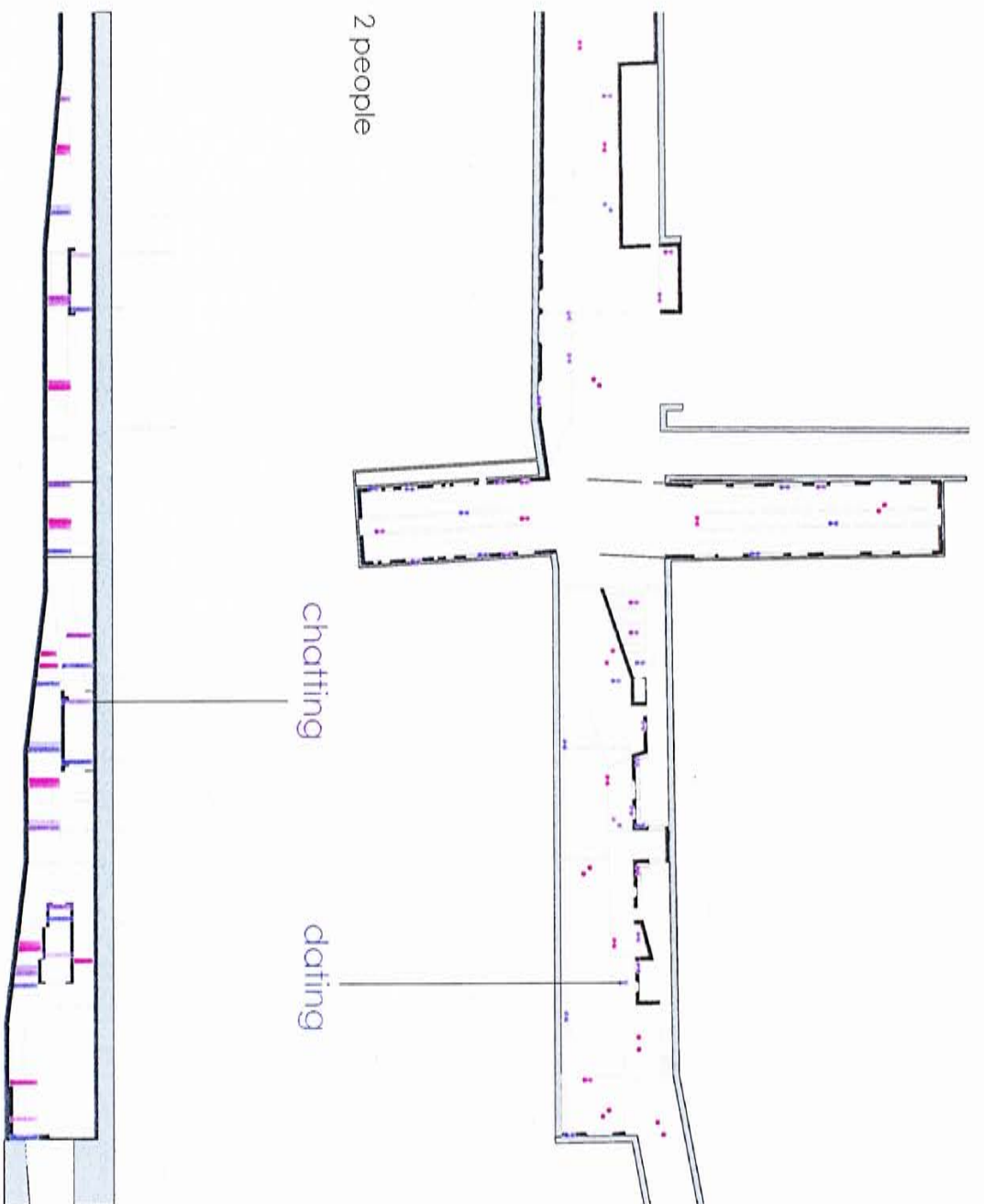


Transverse section





**Event diagrams** - possible events generated by different groups

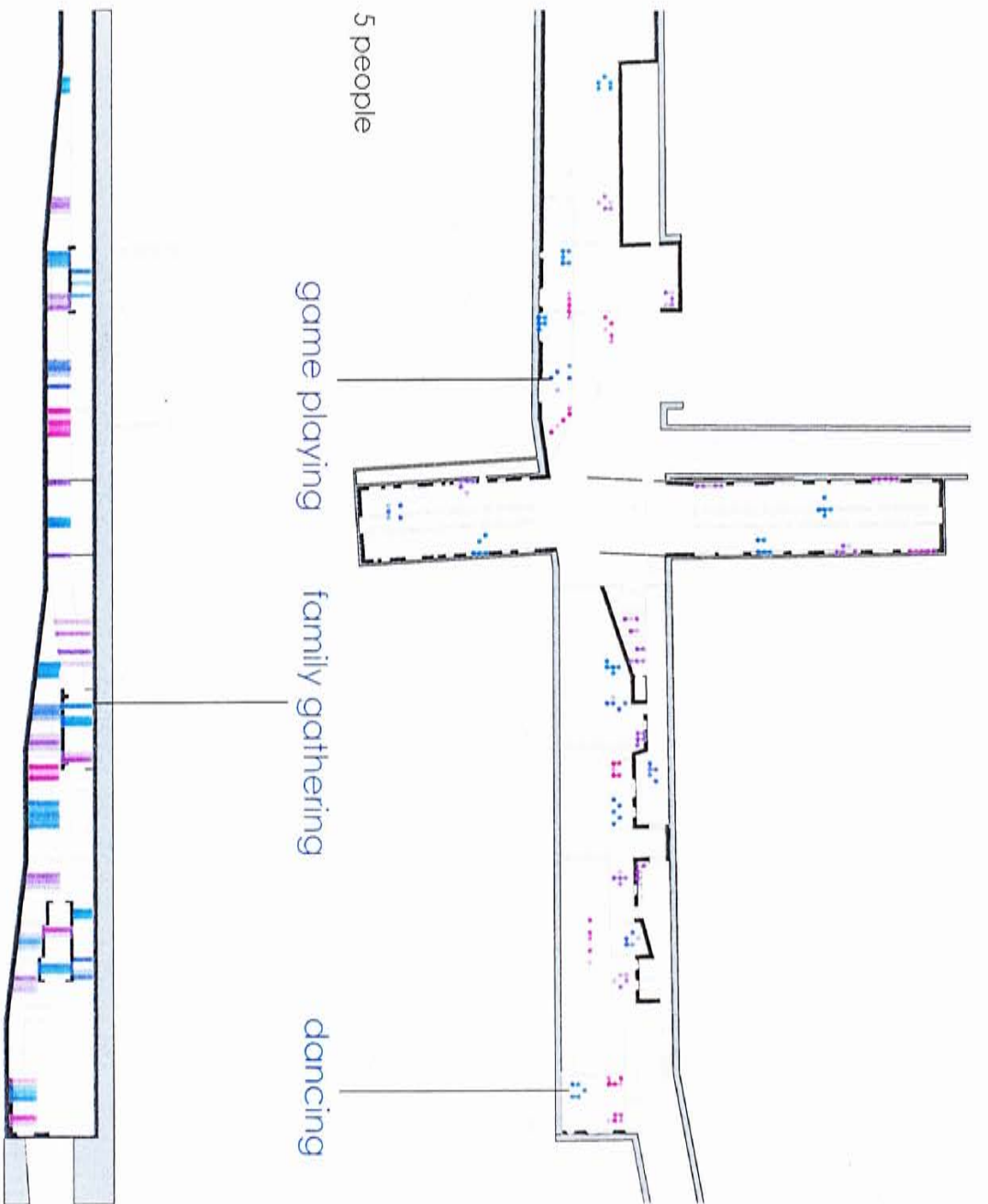


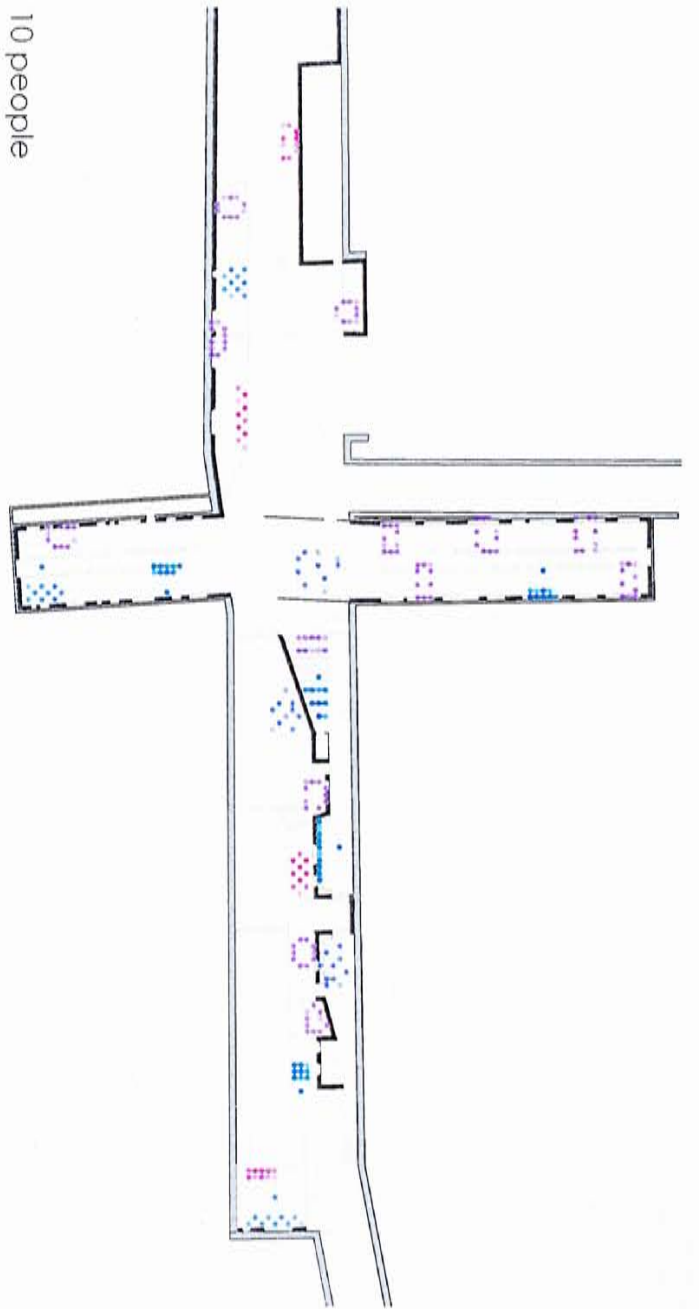
2 people

chatting

dating

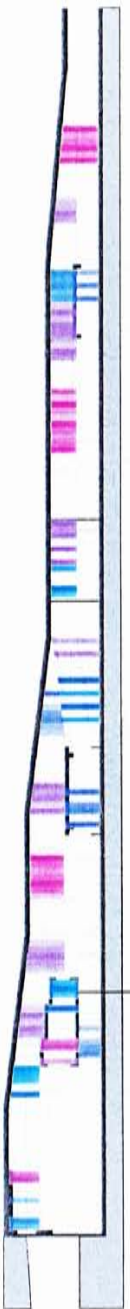




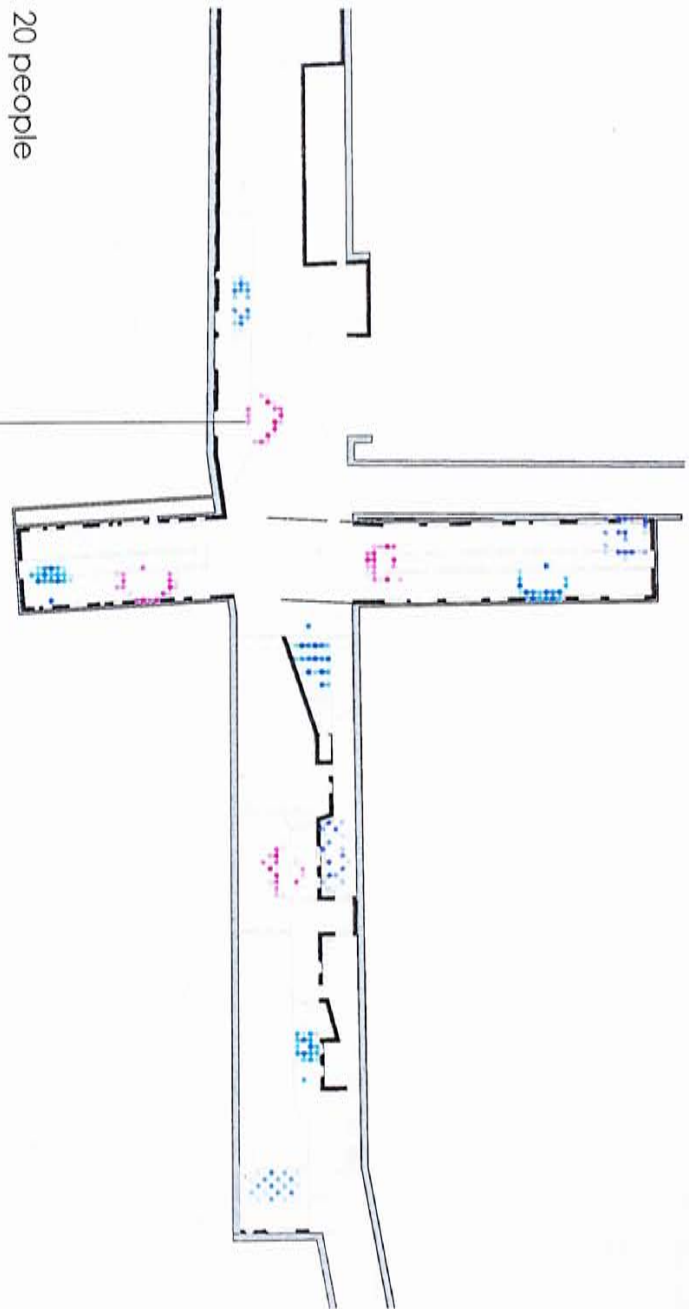


10 people

class teaching



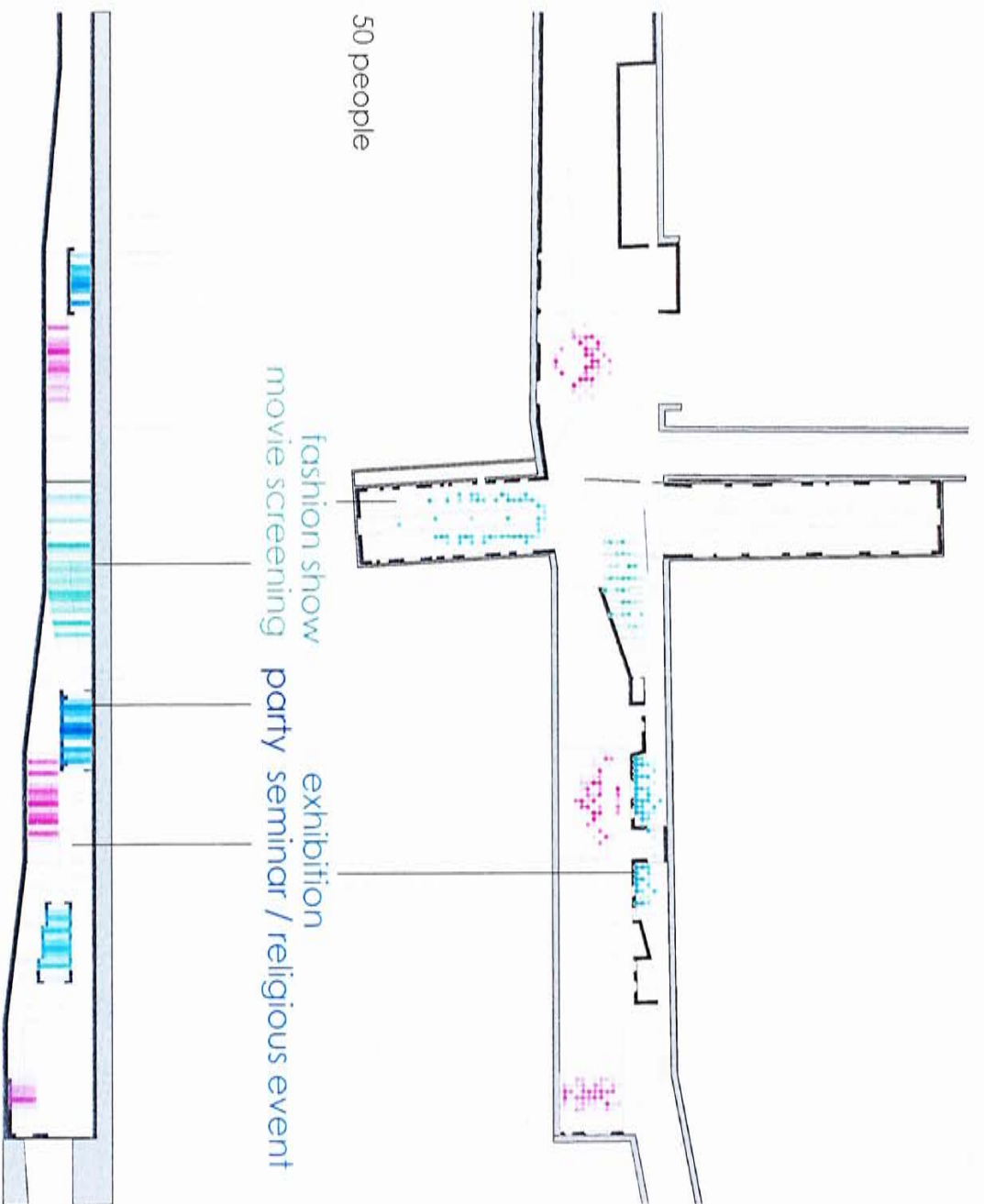




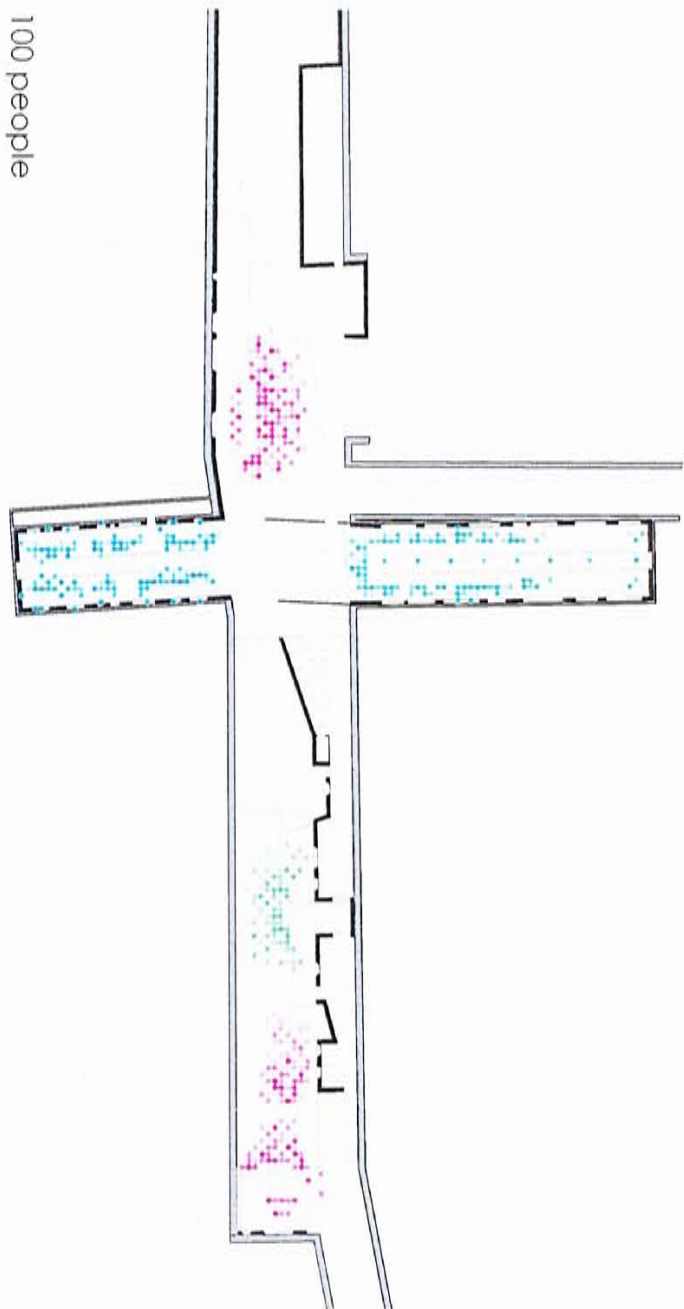
20 people

performing + audience

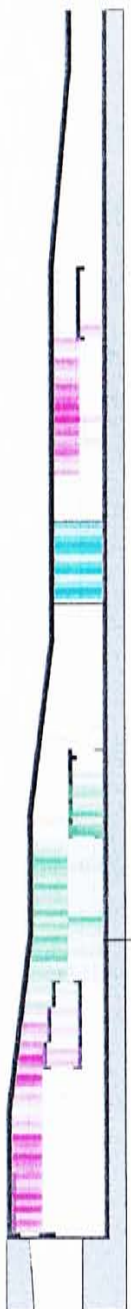




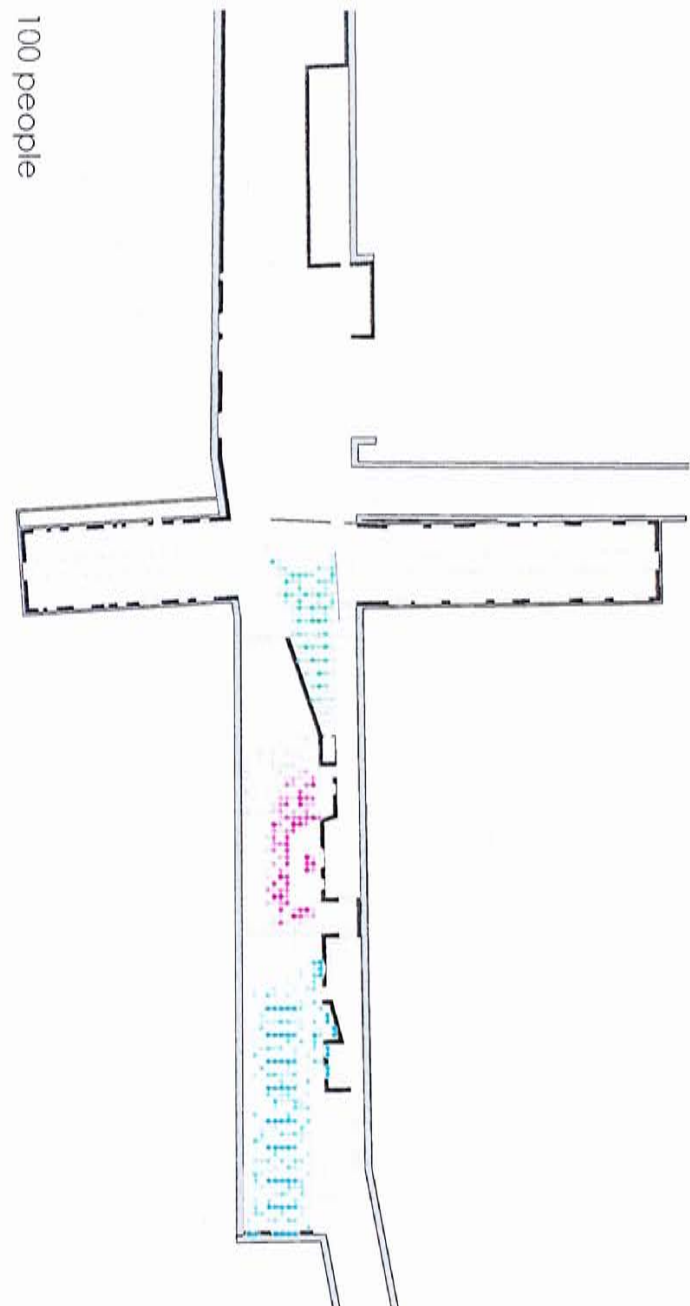




100 people



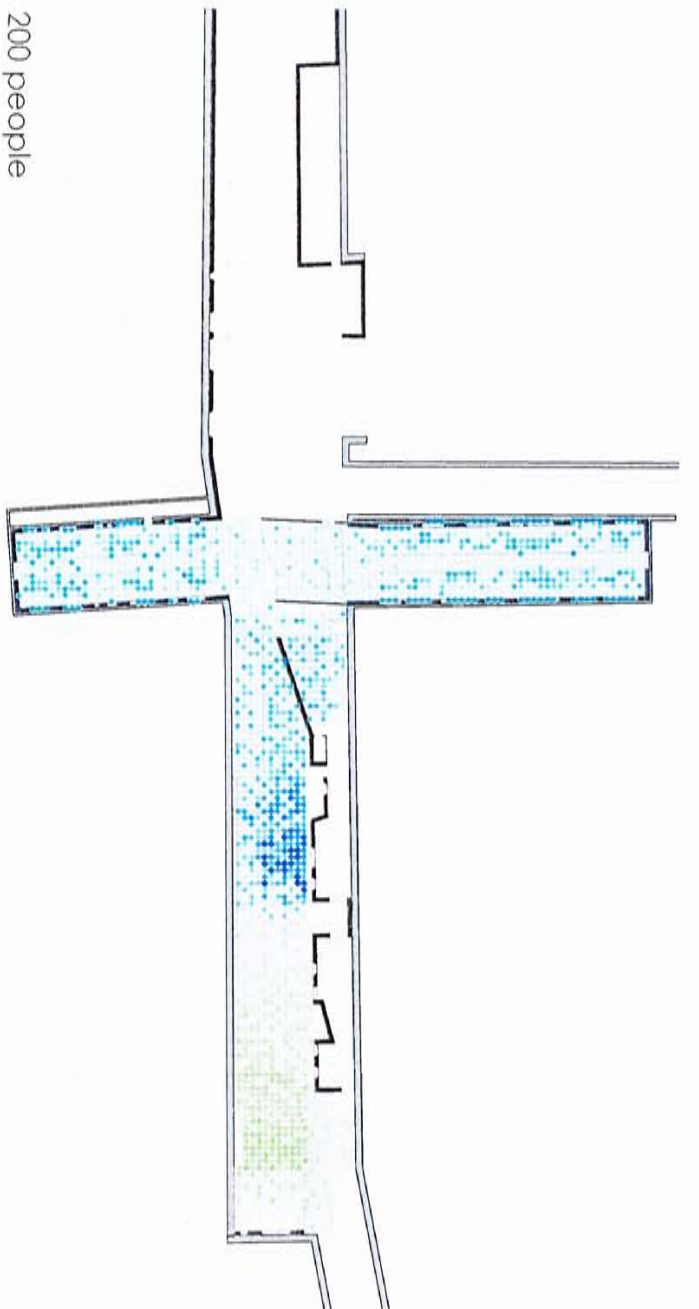
speech



100 people

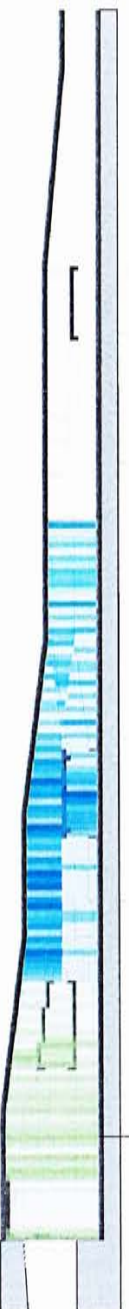


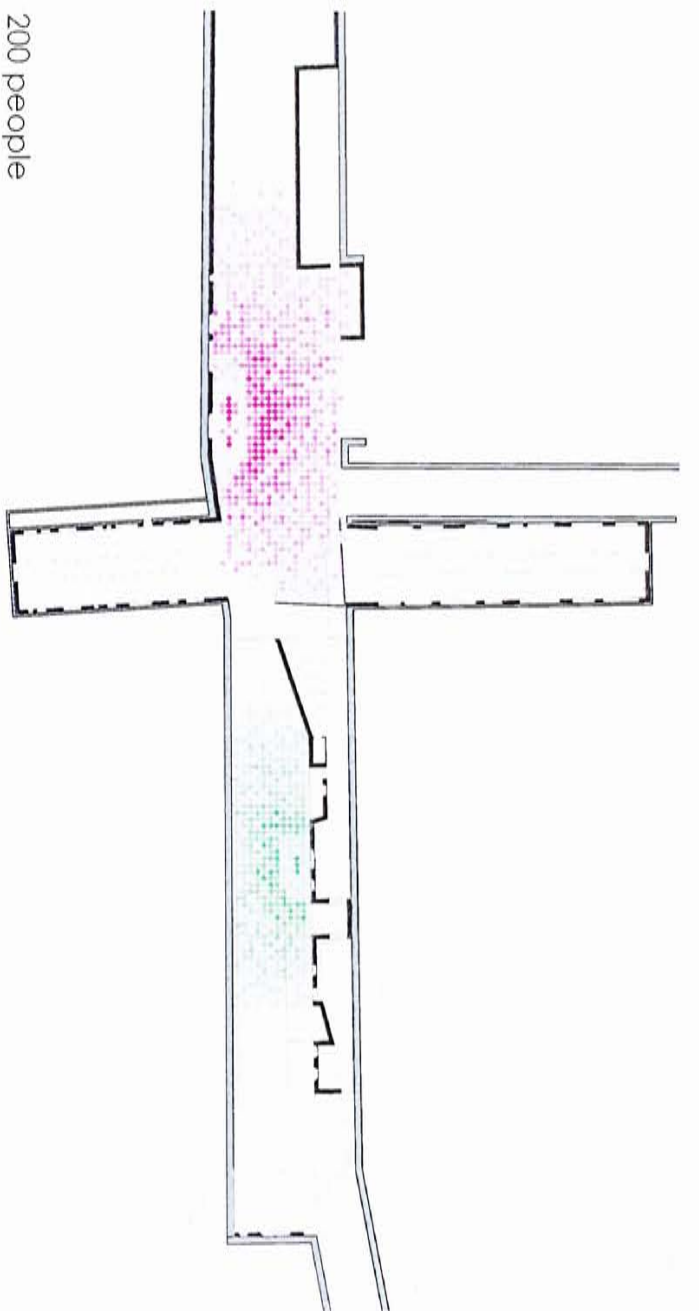




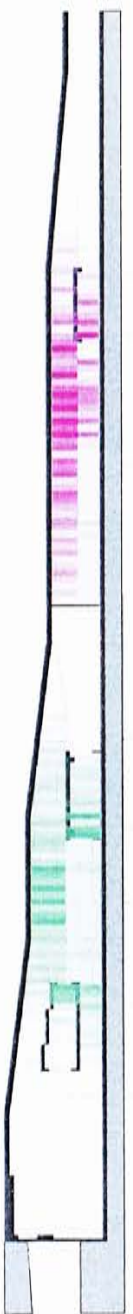
200 people

event broadcasting

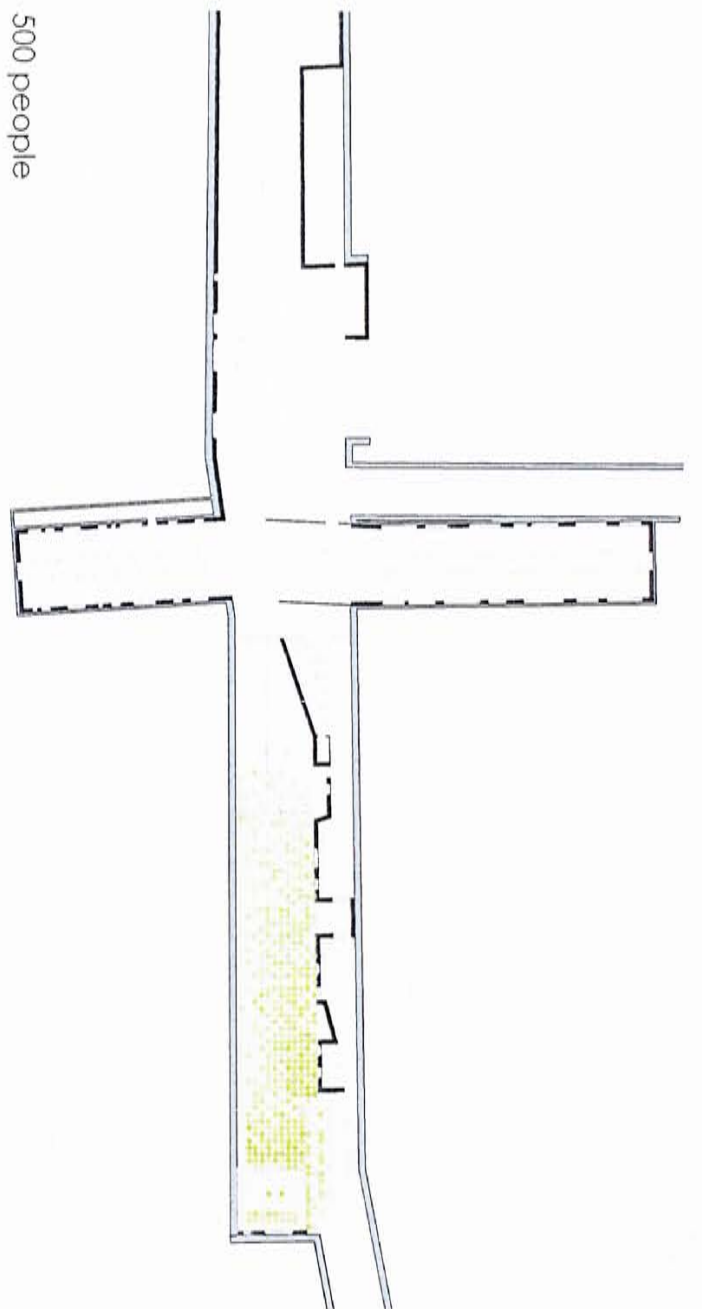




200 people





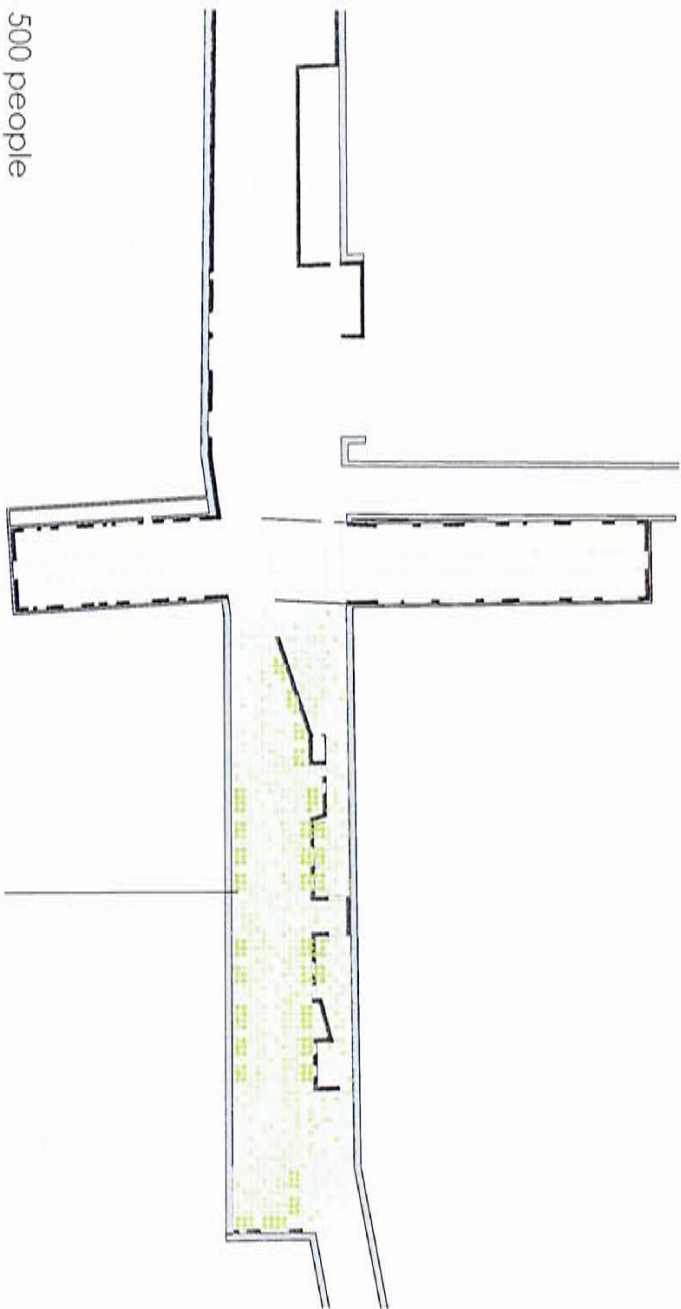


500 people

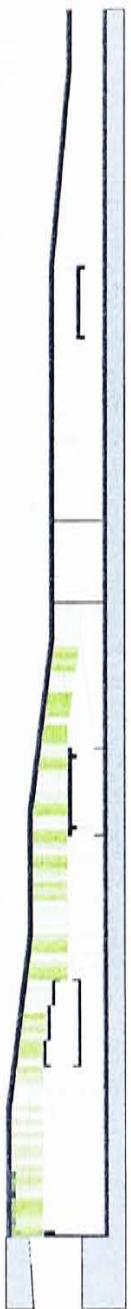
concert



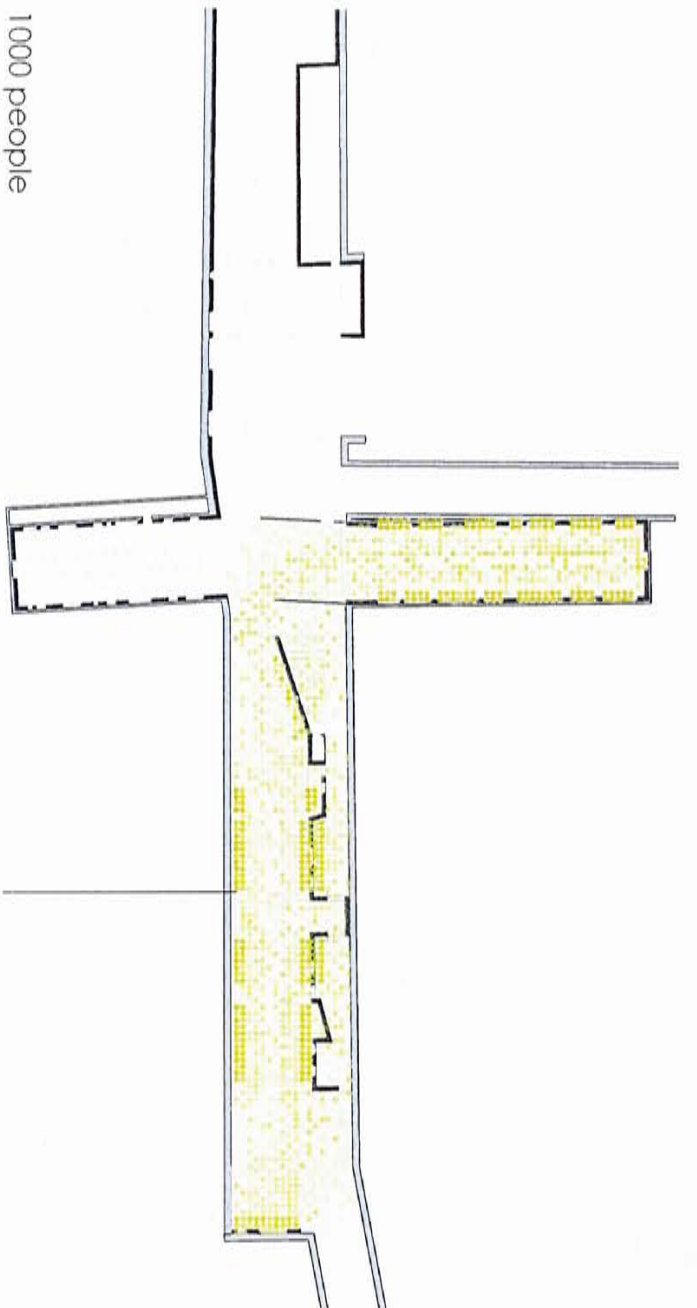
500 people



flea market

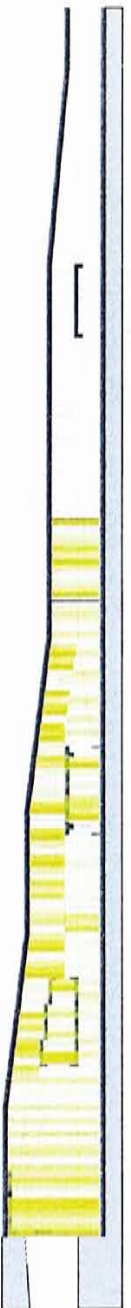


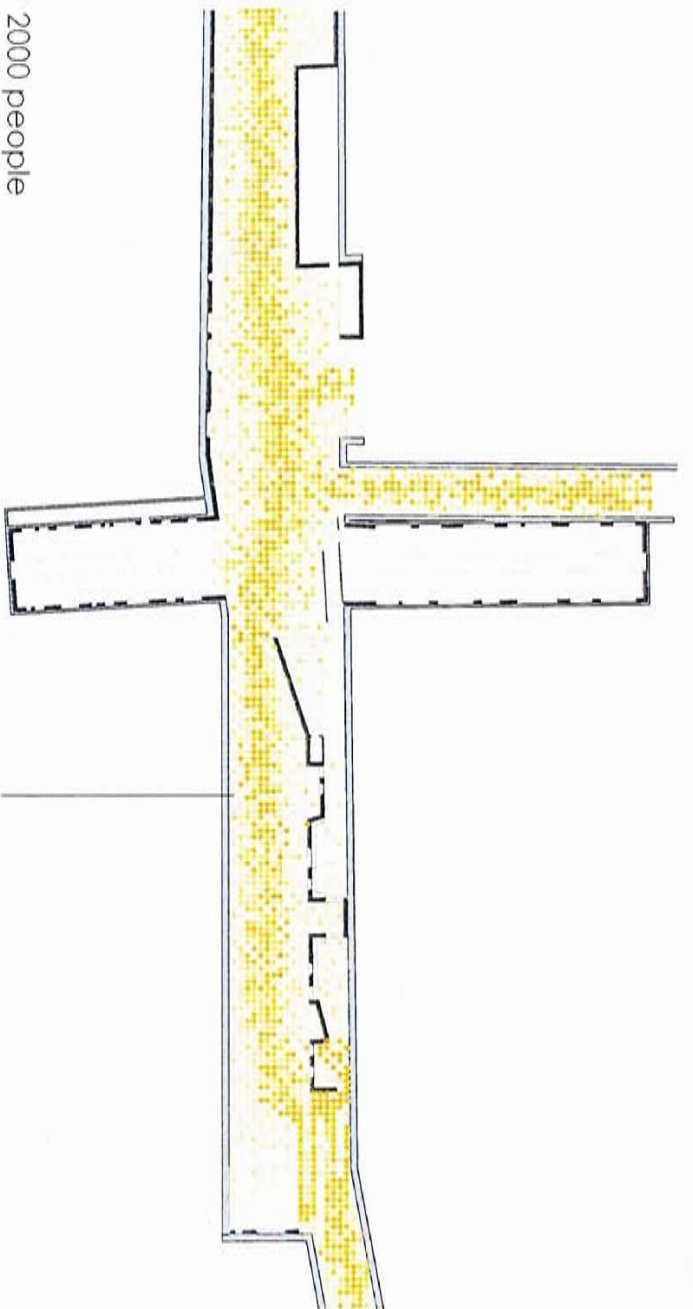




1000 people

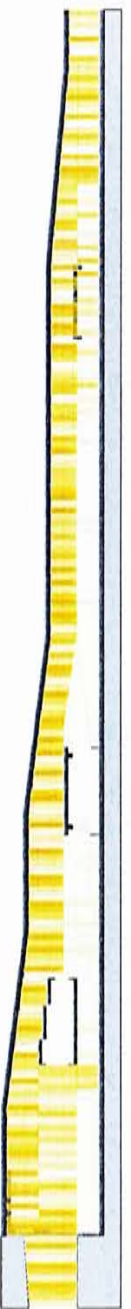
festival celebration / carnival



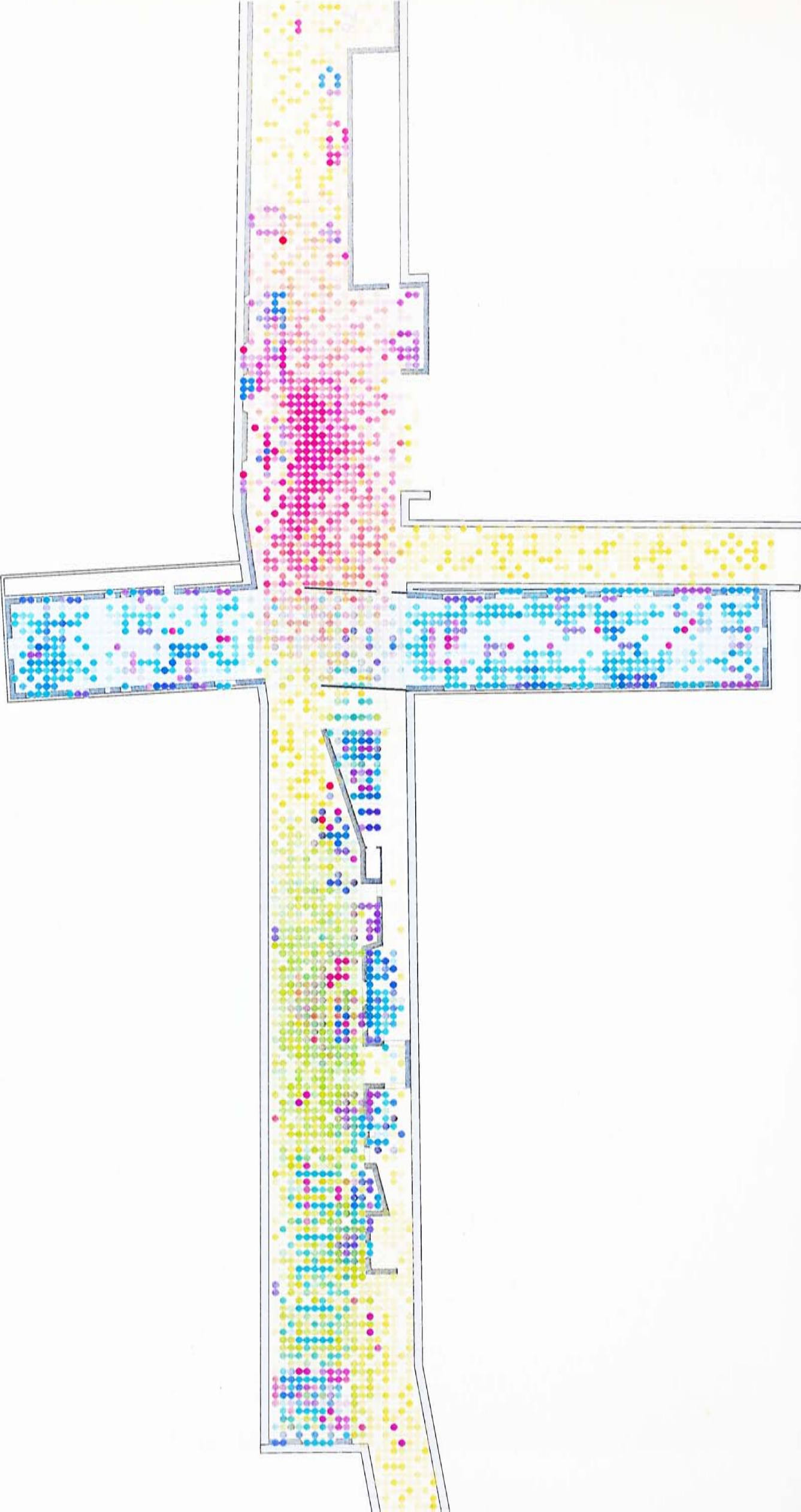


2000 people

facilitating passengers for big event in TST / marathon / parade







**Composition diagram**

It demonstrates the overlapping of different events. People come to the space on their own purposes, but they may become both the performer and the audience for the others. And the events may change from time to time.











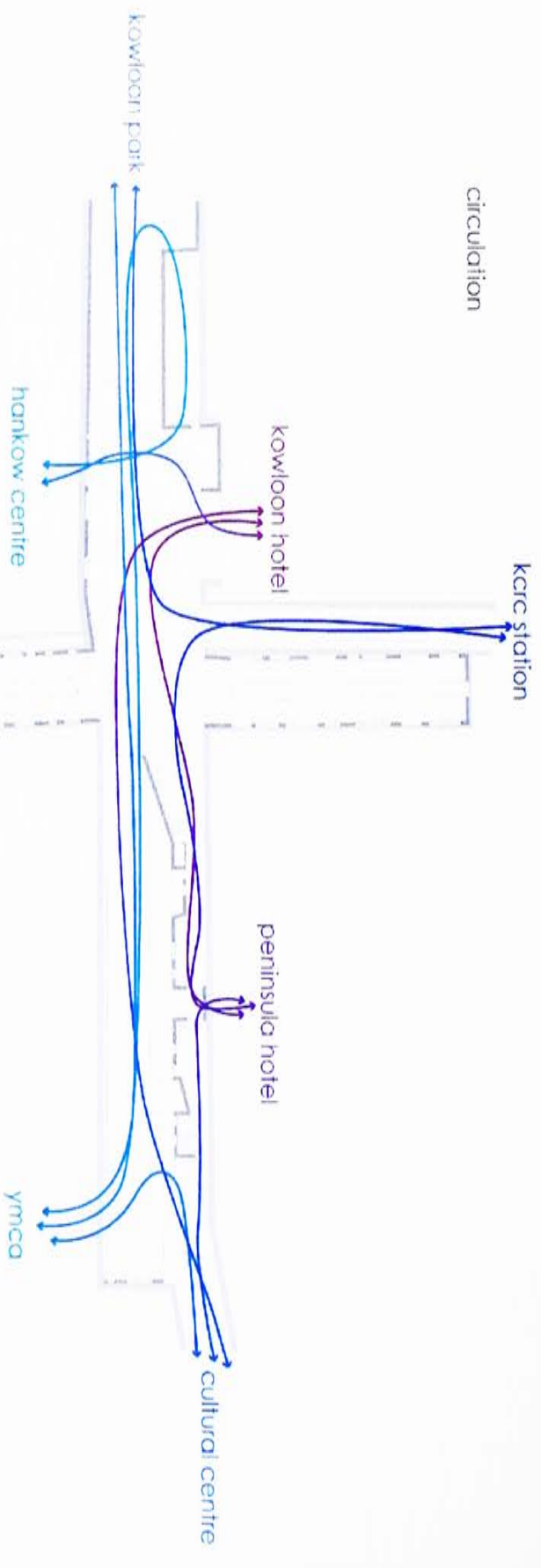




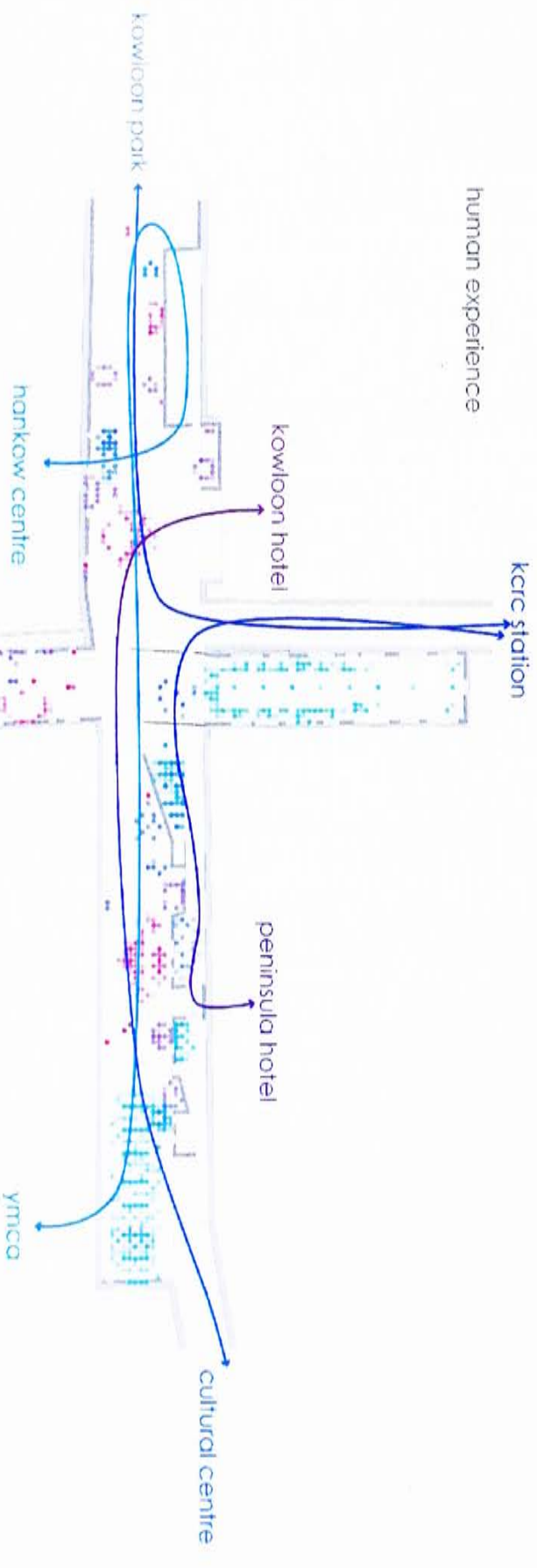




## Circulation



The underground space provides connections for users at different locations.

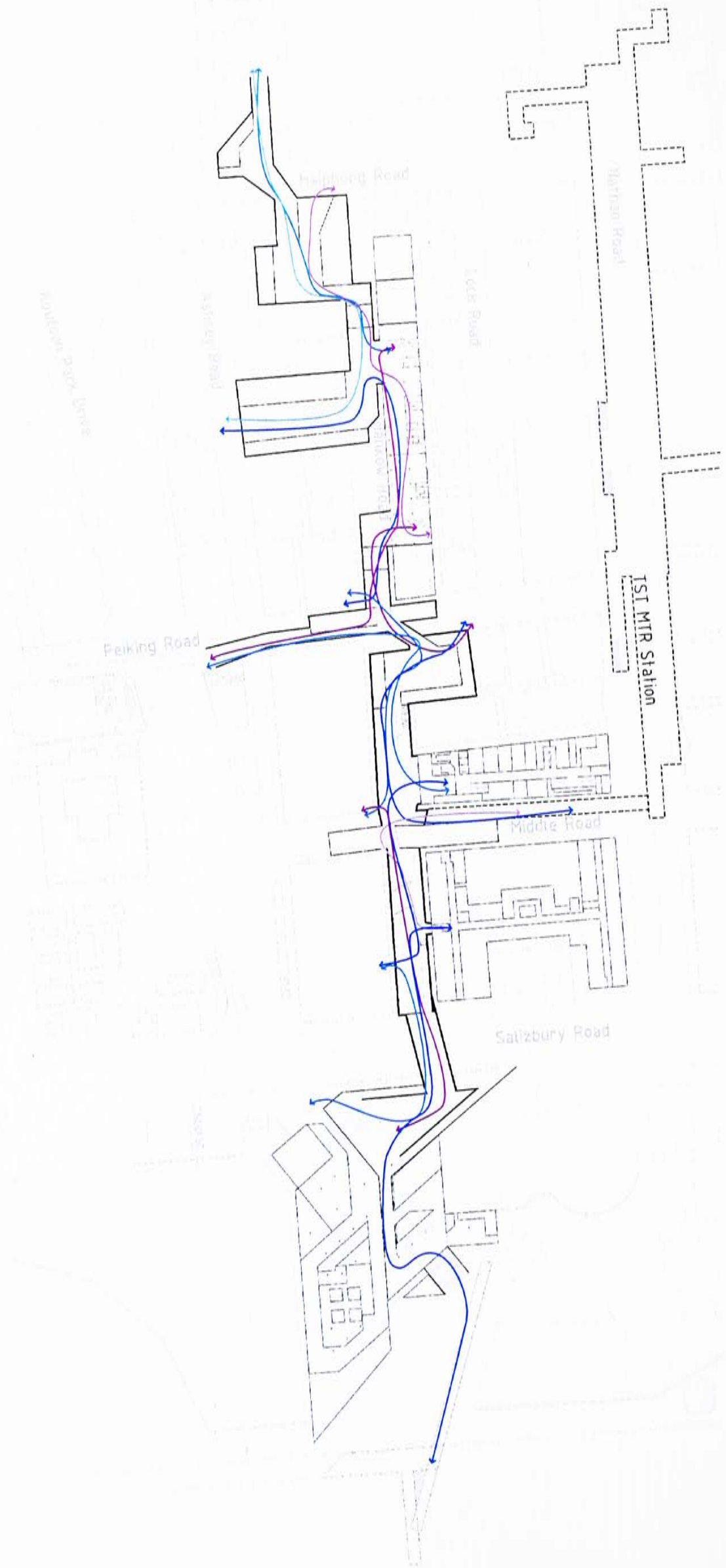


## Human experience

The events are always changing. People staying or passing through may meet the others and take part in the "unexpected" events thus further enrich the human experience and interaction.

The underground space extends and connects the major nodes of the fragmented TST forming an Urban Path.

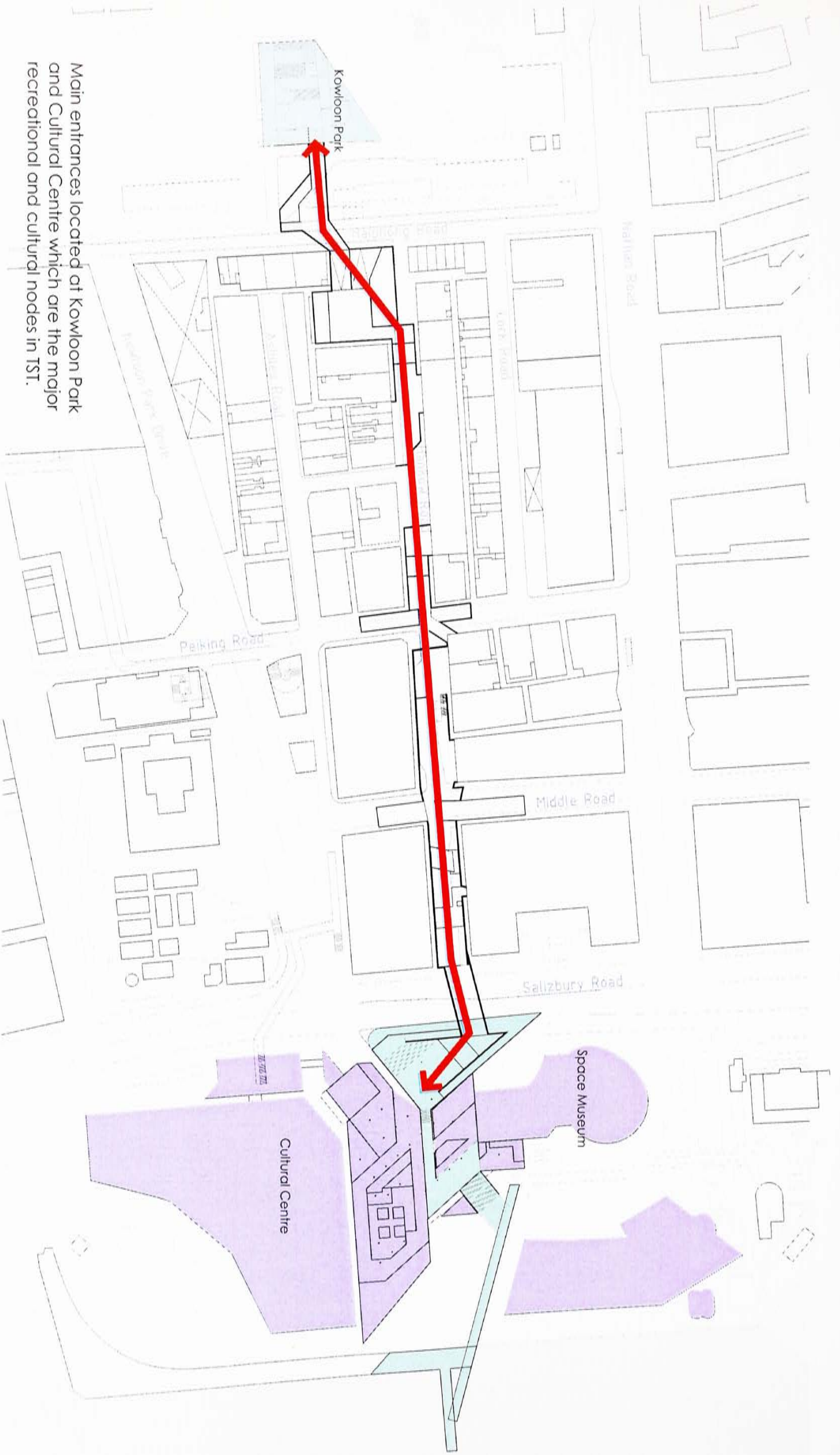
**Site plan**

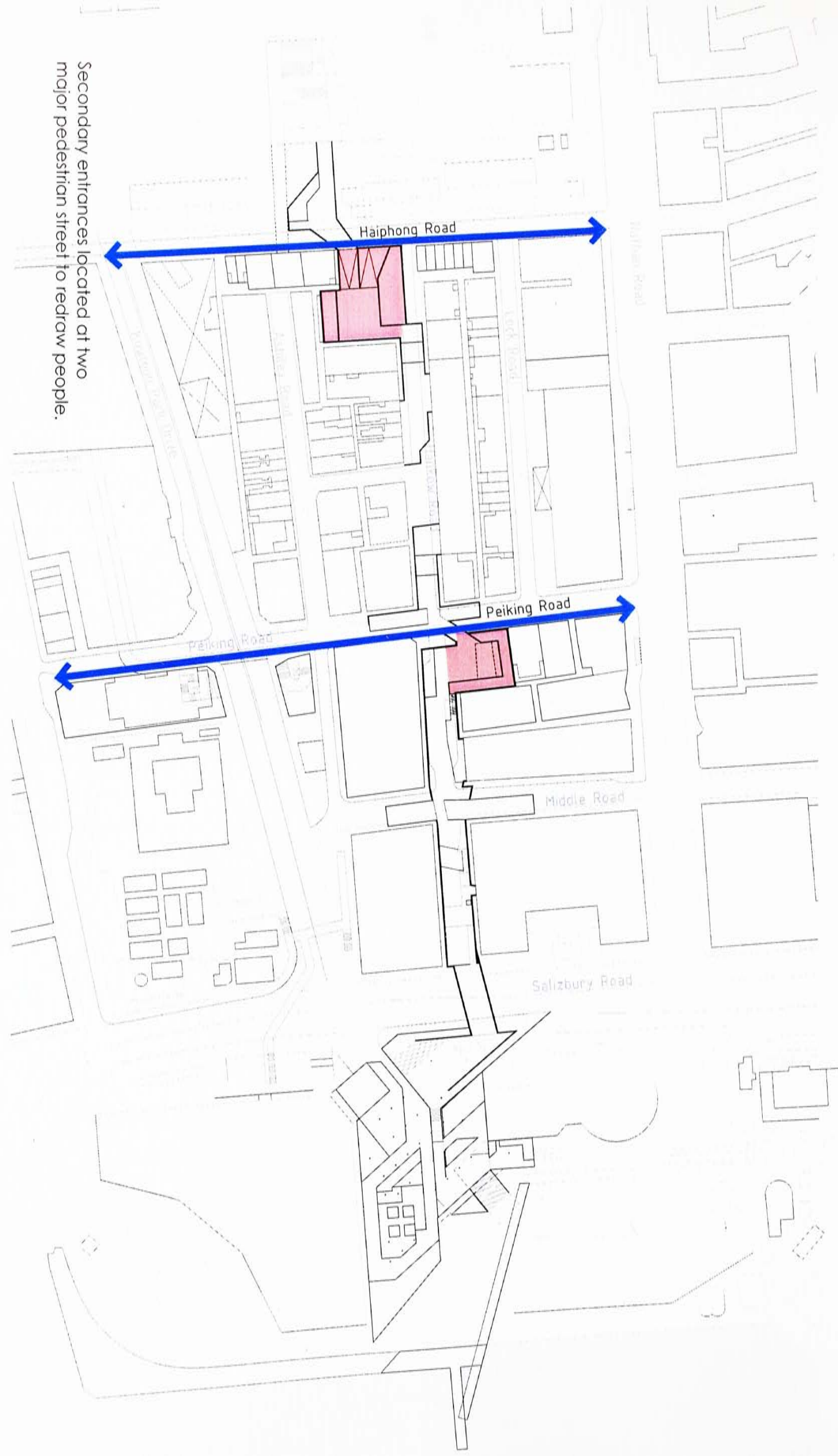




Main entrances located at Kowloon Park and Cultural Centre which are the major recreational and cultural nodes in TST.

Site development - Phase 1



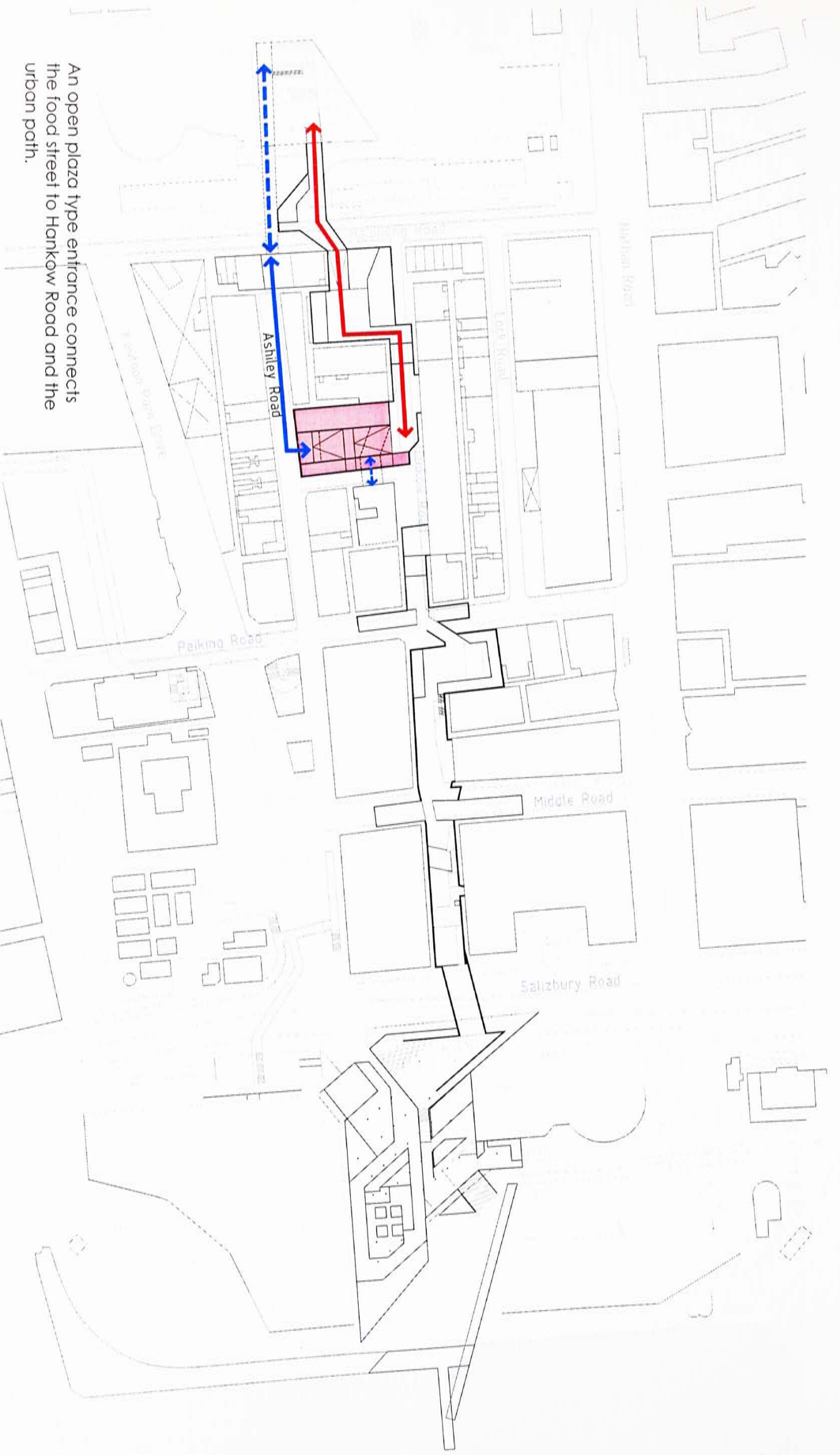


Secondary entrances located at two major pedestrian street to redraw people.

Site development - Phase 2

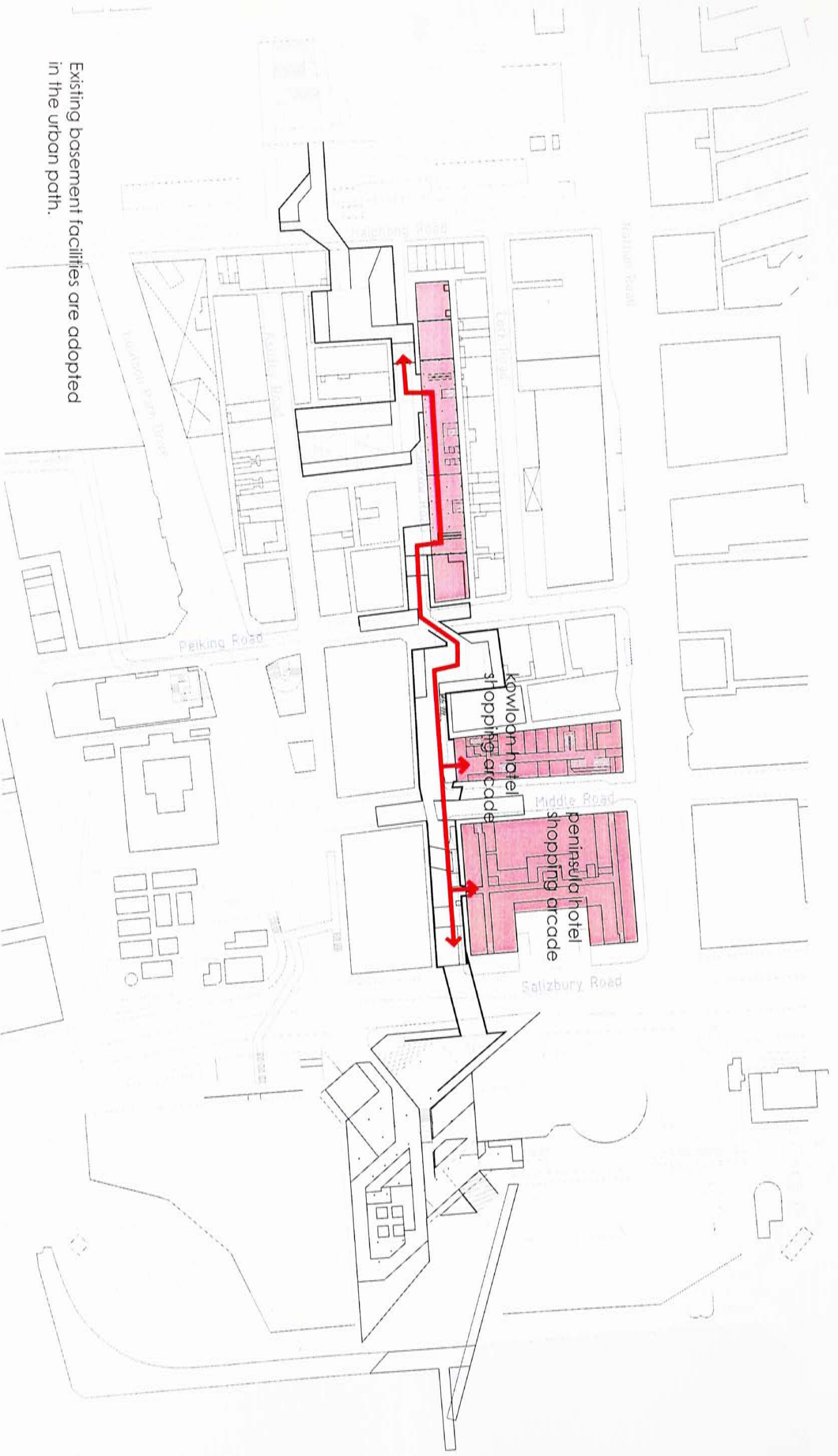


An open plaza type entrance connects the food street to Hankow Road and the urban path.



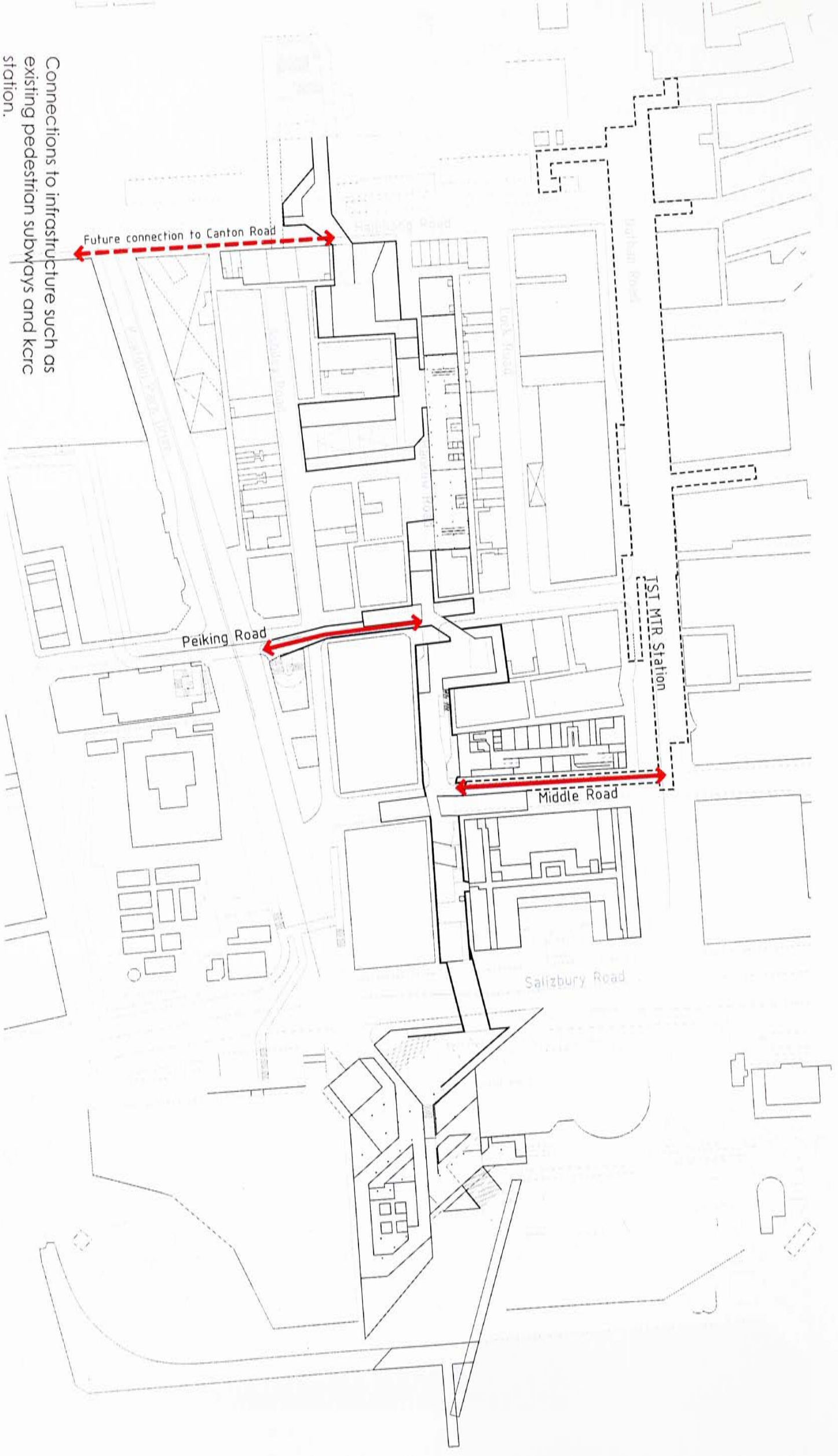
### Site development - Phase 3

Existing basement facilities are adopted in the urban path.



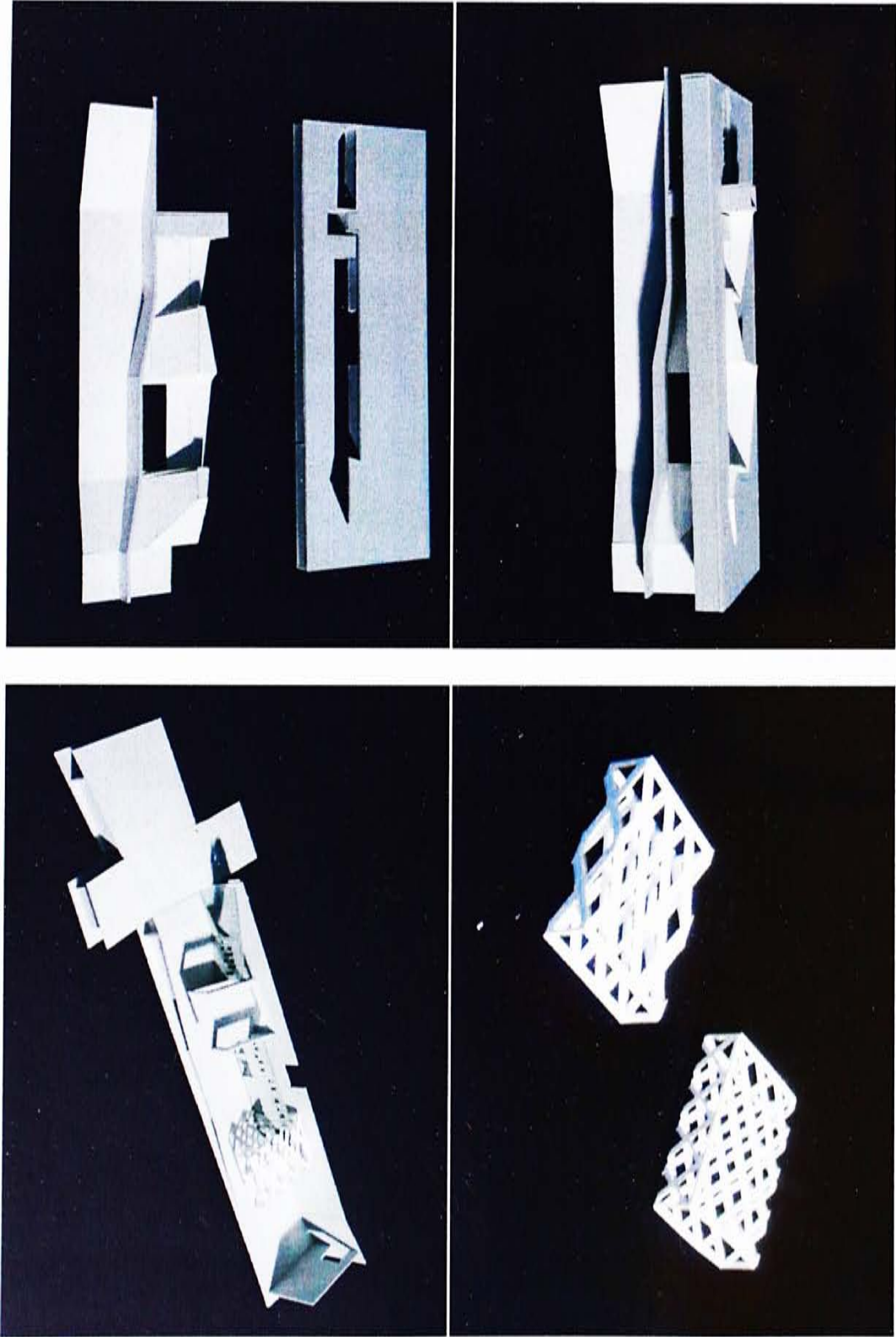
Site development - Phase 4





Connections to infrastructure such as existing pedestrian subways and kerc station.

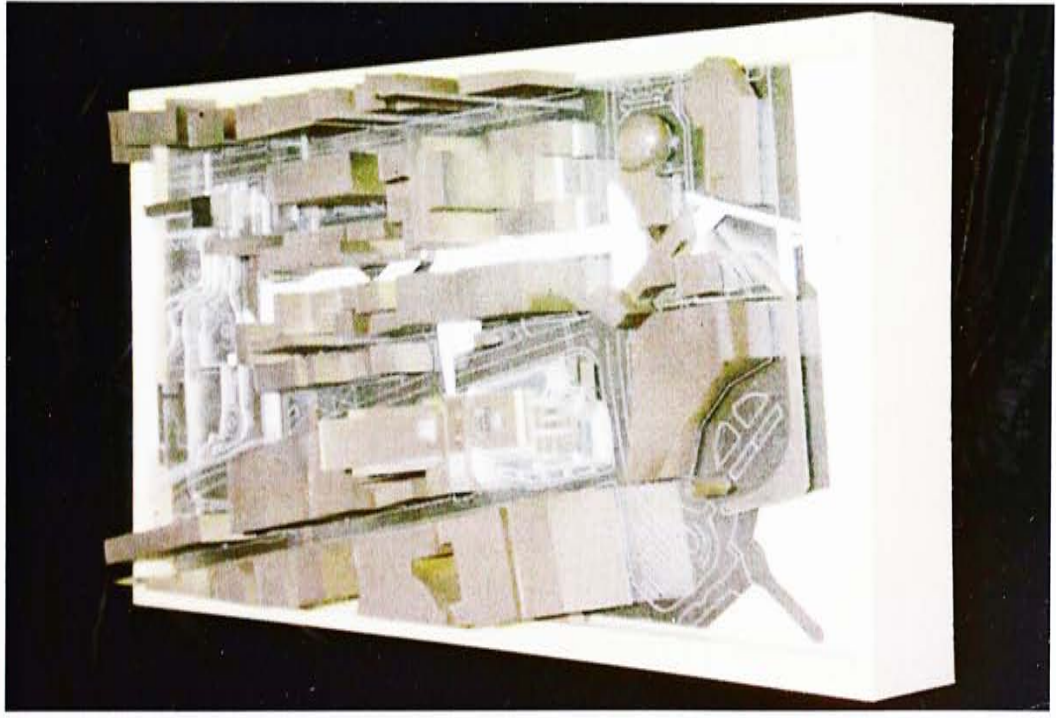
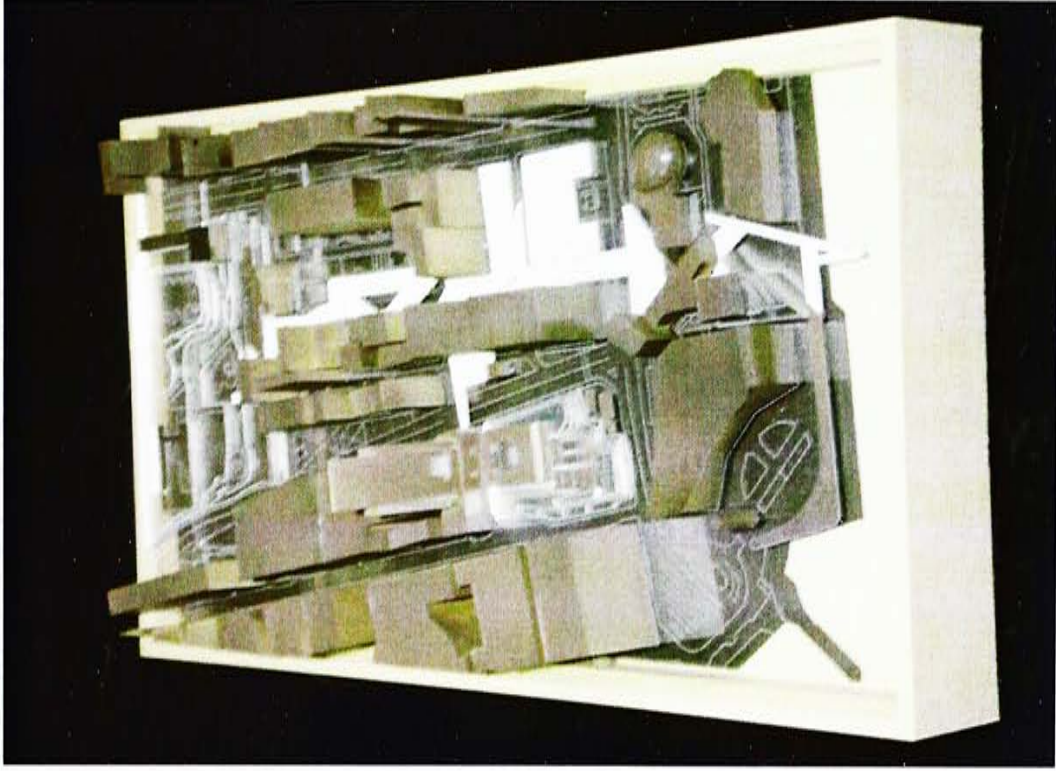
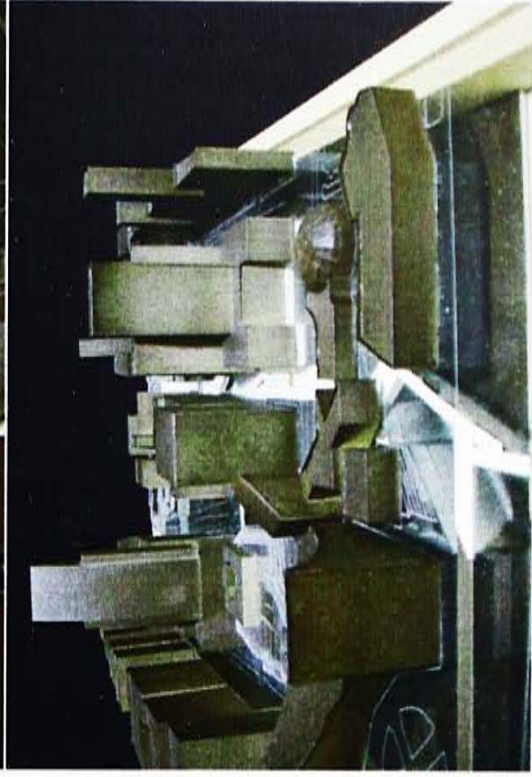
Site development - Phase 5



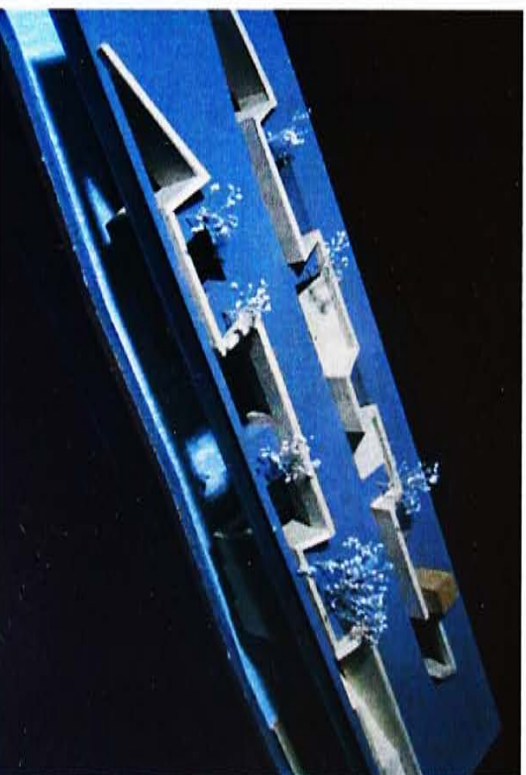
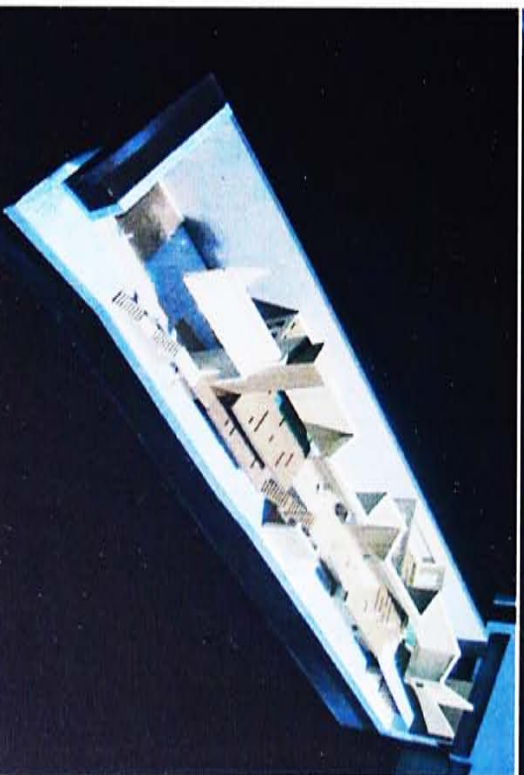
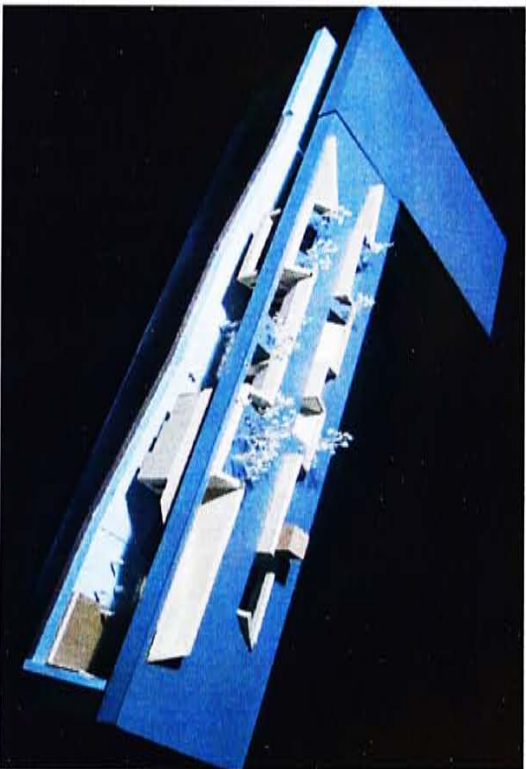
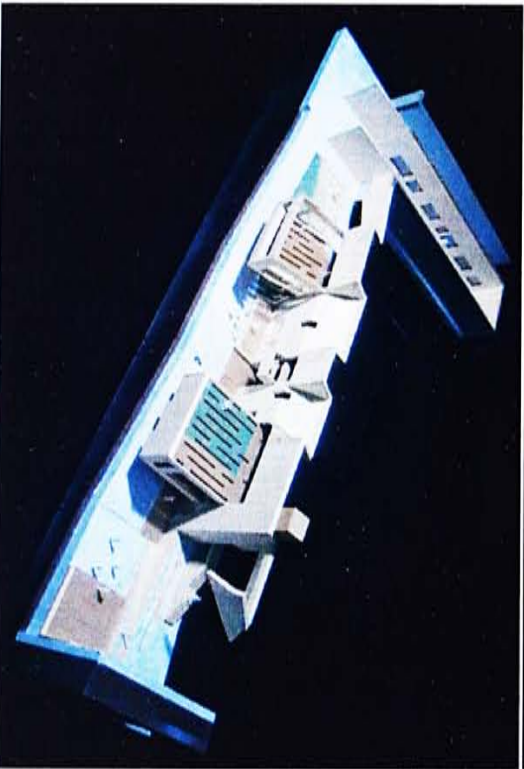
Study model



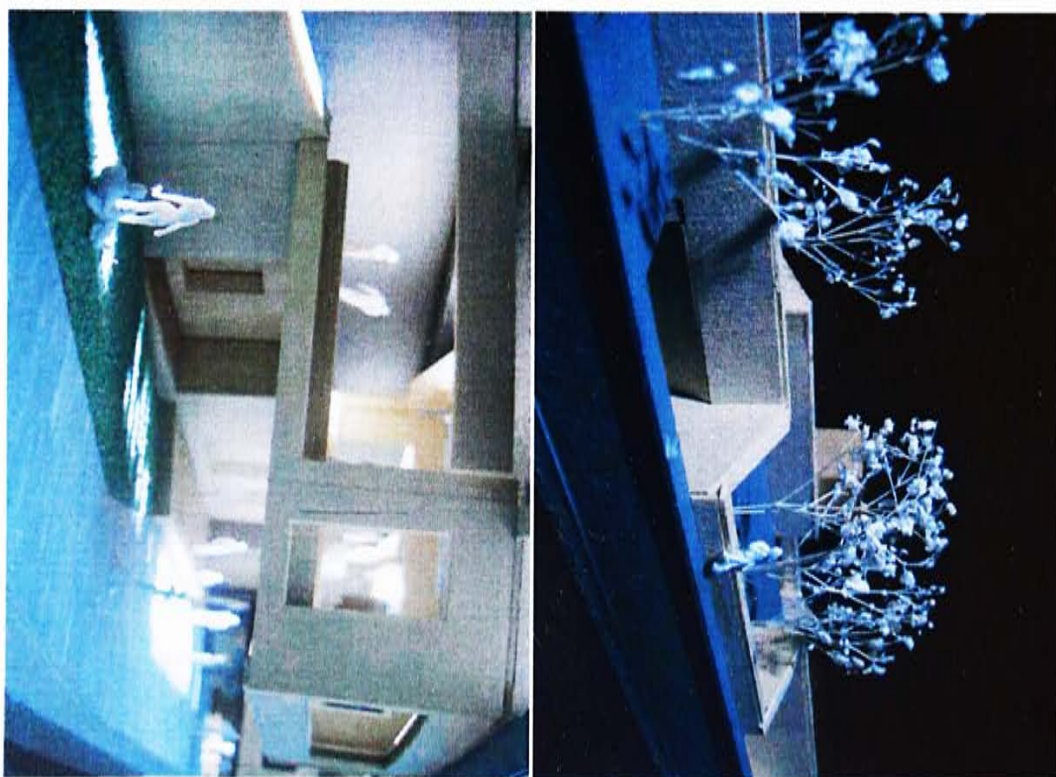
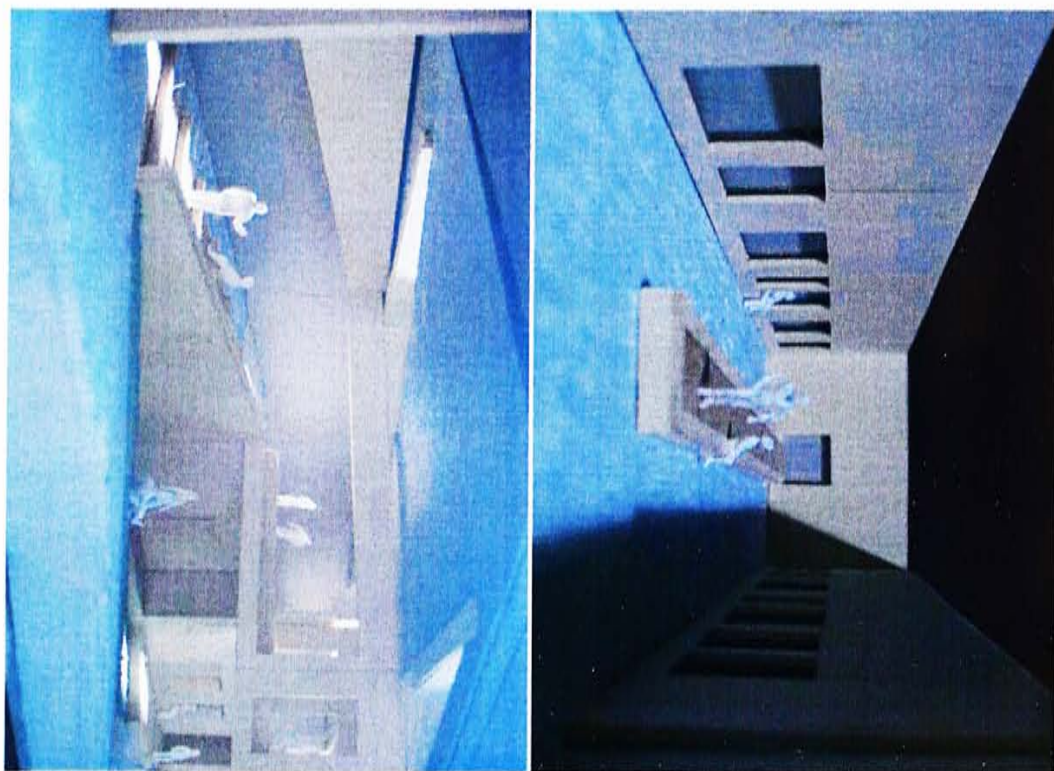
Site model

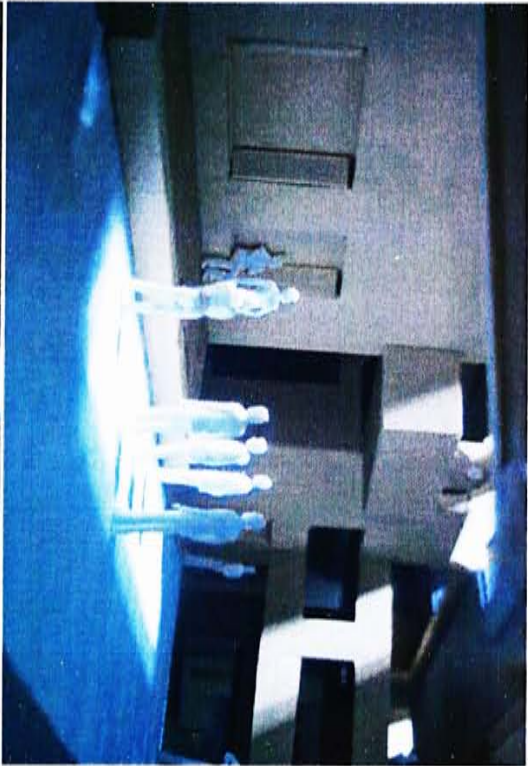
















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28 JUL 2006 4:45 pm	20 DEC 2010 8:45 pm	25 FEB 2013 6:30 pm
17 OCT 2006 3:56 pm	17 JAN 2011 8:45 pm	- 1 MAR 2013 6:30 pm
20 NOV 2006 8:04 pm		
17 JUL 2007 6:45 pm	6:45 pm	
24 JUL 2007 6:45 pm	21 FEB 2013	
18 SEP 2007 8:45 pm		
17 SEP 2007 8:45 pm		

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